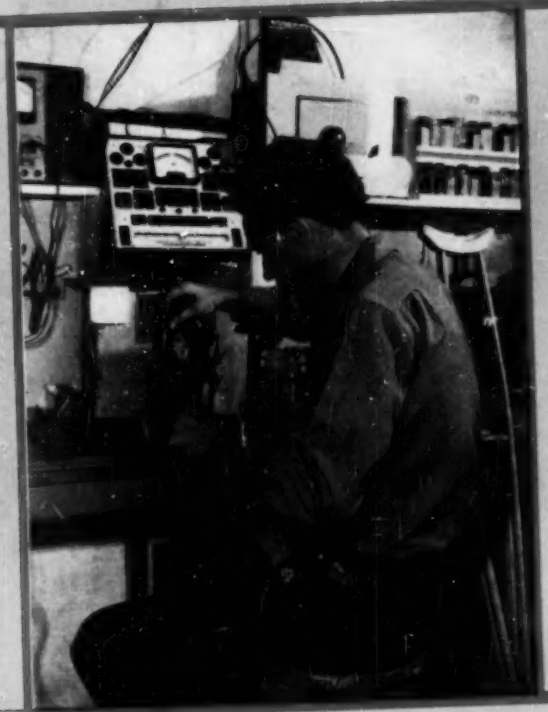
JANUARY, 1949 Vol. 38, No. 1

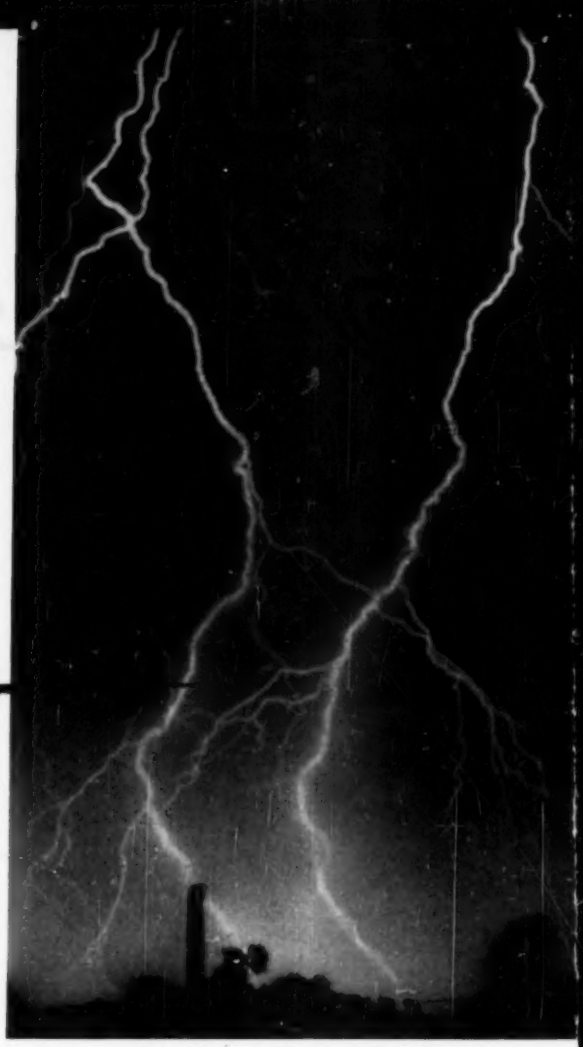
Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine



SEASON'S GREETINGS

then ... the flash of light



Photograph courtesy Westinghouse Electric Corporation

PHYSICISTS say a bolt of lightning occurs when a negative charge in the clouds and a positive charge in the earth reach a spill-over point. Then almost as if feeling its way blindly, an arm or tentacle of current probes its way earthward; it touches, and a tremendous burst of illumination springs skyward.

Almost as if feeling *its* way blindly, the negative potential that is the growing youngster reaches out for contact. If he is fortunate, if he finds a good and positive potential in the teacher he has, then often it is as if a burst of light passes from teacher to pupil. Then often the youngster sees as if in a flash of light the opportunity that life presents to him, the terms on which the offer is made, how he may comply.

Perhaps here the analogy ends, for hereafter it is a task of building such perceptions into abiding standards and habits. But the whole vital point is that the lad *will* build up habits whether or no, habits that are good or bad depending on whether there has been contact and illumination.

When the youngster first comes to drafting class, with what potential will he be met . . . the *negative* potential of indifference which repels . . . or the *positive* potential of interest, enthusiasm and a concern for the finest? Will he be met with an attitude that implies the *tools* of the work are not important . . . and, therefore, the work itself is unimportant? Or will he be met by a recognition that these first tentative steps *do establish direction, that the only possible direction can be utmost concern for the work and utmost concern for the tools of that work?* Inspiration never *can* be built on the shoddy and the indifferent.

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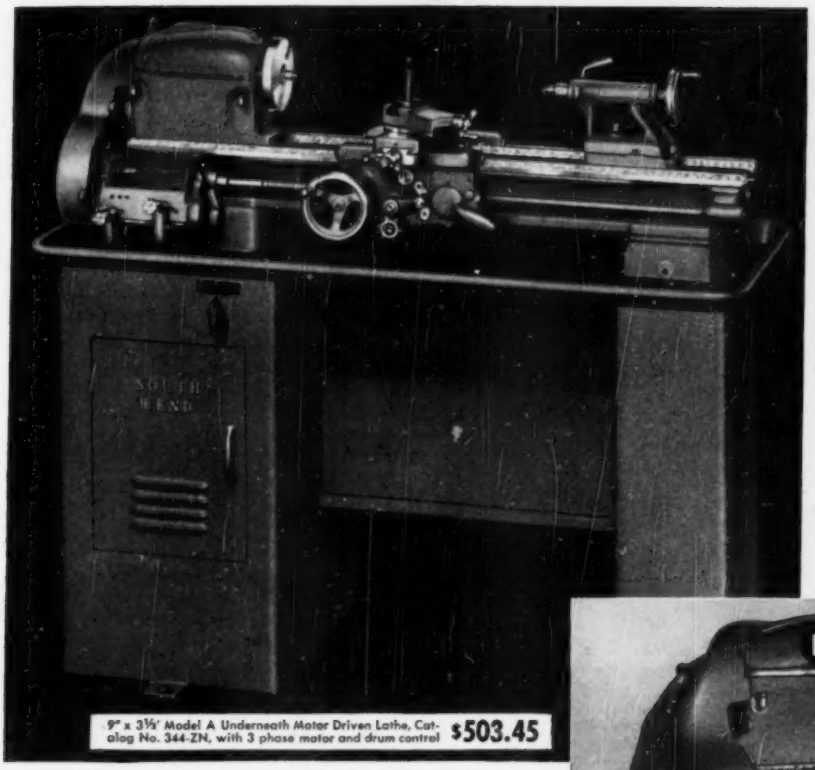
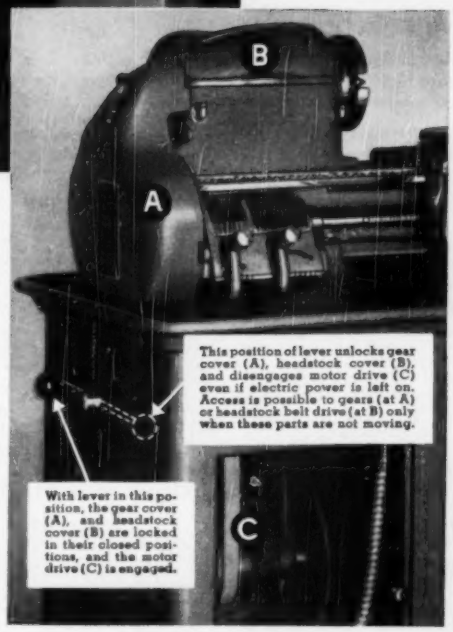
SOUTH BEND 9" LATHE



9" x 3½' Model A Underneath Motor Driven Lathe, Catalog No. 344-ZN, with 3 phase motor and drum control **$503.45**

Ideal for School Shops


B
A
C
This position of lever unlocks gear cover (A), headstock cover (B), and disengages motor drive (C) even if electric power is left on. Access is possible to gears (at A) or headstock belt drive (at B) only when these parts are not moving.
With lever in this position, the gear cover (A), and headstock cover (B) are locked in their closed positions, and the motor drive (C) is engaged.

This 9-inch swing South Bend Precision Lathe is small enough for the Junior High School boy to handle with ease, yet it has ample capacity for most shop projects. Ruggedly constructed for industrial service, it will withstand the abuse of student operation. Neat and compact in design, it presents an excellent appearance in the shop, and is economical of floor space and power. A built-in chip pan catches shavings and prevents the shop floor from becoming littered.

All gears, belts, and pulleys are fully enclosed. The motor and driving mechanism are built into the cabinet base under the headstock. Neither the end gear guard nor the cone pulley cover can be opened until driving power is disconnected. This, and other safety features, make the lathe almost foolproof. See illustration at right.

The price of this fine lathe complete with three-phase motor and drum control switch is only $503.45, f.o.b. South Bend. This low price enables you to provide more lathes — train more students on a limited budget.

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"UTILITY"

METAL CUTTING SAWS

BUILT JUST LIKE THE LARGER MODELS USED IN INDUSTRY

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The RACINE "Utility" METAL CUTTING SAW duplicates in operation and controls the larger models used by industry — yet is large enough for most cutting work required in the vocational class.

WET-CUT MODEL . . . Coolant is contained in reservoir in base of model which also houses pump for forcing coolant to saw blade. Wet-Cut model runs at higher speeds and has larger motor.

DRY-CUT MODEL . . . Principle of operation and working parts are the same as the Wet Model. In place of the cabinet type base, the Dry Model rests upon four sturdy iron legs.

Advantages of the RACINE "Utility"

CAPACITY: The "Utility" will accommodate cuttings up to 6" x 6" in metals ranging from soft aluminum tubing to hard alloy steels.

HYDRAULICALLY CONTROLLED SAW FEED AND PRESSURE . . . provides controlled oil-cushioned cutting for greater accuracy and speed with longer blade life.

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SWIVEL VISE . . . Quick acting, self-positioning type. Cuts any angle up to 45°.

AUTOMATIC KNOCKOUT . . . Disengages clutch at completion of cut and raises saw frame to highest point.

SAFETY FEATURES . . . All moving parts are guarded against accidents —an important point to consider when machines are to be used by students.

LARGER MODELS AVAILABLE . . . Heavy duty hydraulic saws are available for big production jobs. Complete details upon request.

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with *LUFKIN* Precision Tools

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Precision Tools—Tapes—Rules
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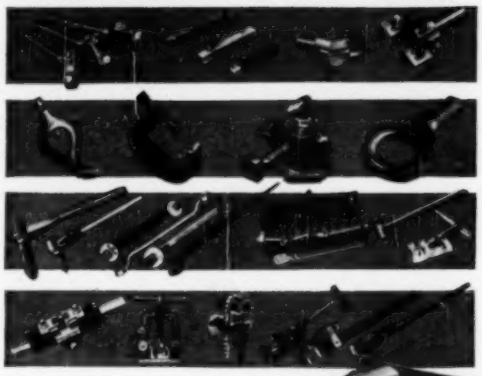
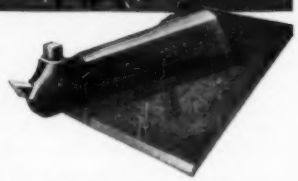
ARMSTRONG



Every tool shown represents a full line of quality tools, known the world over as the finest of its type.

Armstrong Tools are stocked by Industrial Distributors.



Write for New S-48 catalog just released.

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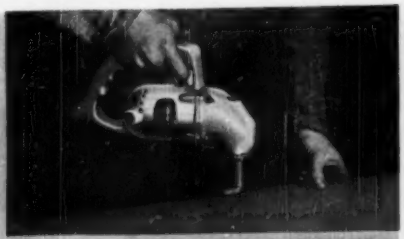
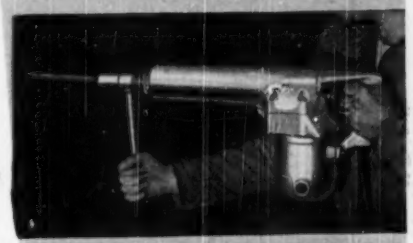
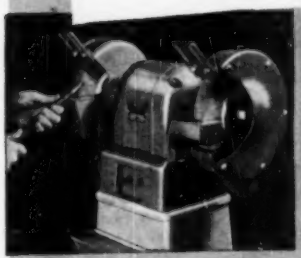


Clean-cutting B&D Electric Porto-Shear, cutting 16-gage stainless steel here, has cutting action always visible.

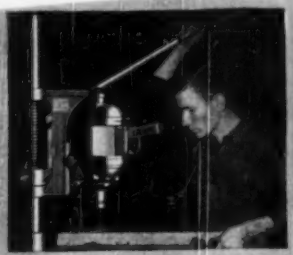
Versatile B&D 7" Heavy-Duty Sander sands cabinet corner. Same tool grinds, wire brushes, planes wood.



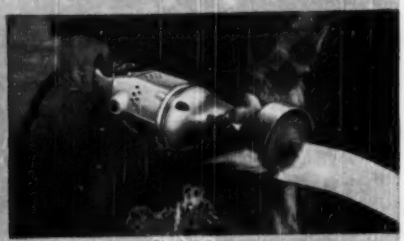
B&D Electric Hammer, shown here drilling in tile for installing toggle bolts, drives many kinds of tools.



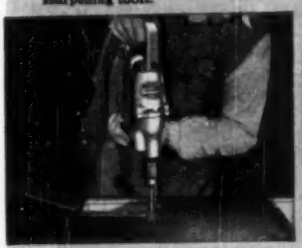
The Fingles Co. uses a B&D Bench Grinder for grinding down welds, beveling edges on stainless steel, sharpening tools.



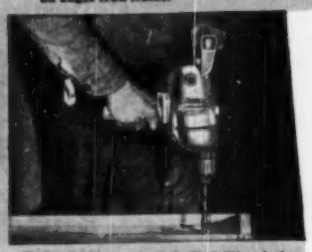
B&D Drill Stands give extra leverage, extra precision. This ½" Drill and No. 60 Drill Stand are drilling a ½" hole in an angle iron frame.



Perfectly-balanced B&D 4" Portable Grinder grinds weld on exhaust fan collar.



B&D Electric Tapper tapping holes in 11-gage cabinet. B&D line also includes 19 Screw Driver and Nut Runner models for speedy assembly.



B&D ½" Standard Drill drilling holes in 10-gage frame. Other B&D Drills from ¼" to 1¼", in Standard and Heavy-Duty models.

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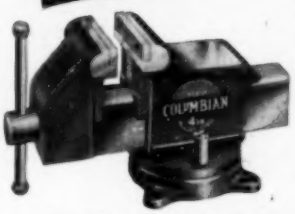
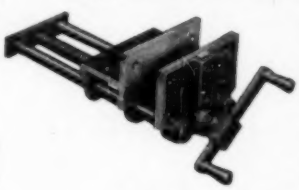


The Columbian 804 Work Shop Vise is a rugged all-purpose vise of steel construction — fabricated by arc welding. Front and back jaws are welded from heavy steel. Screw and handle are cold rolled steel. Each Columbian 804 is finished in red enamel and packed in individual cartons.

Columbian Workshop Vise



★ Columbian Continuous Screw Woodworker's Vises are furnished with hard wood handles — or may be equipped with ADJUSTABLE STEEL HANDLES as above, to eliminate handle breakage, speed operation and provide extra leverage.

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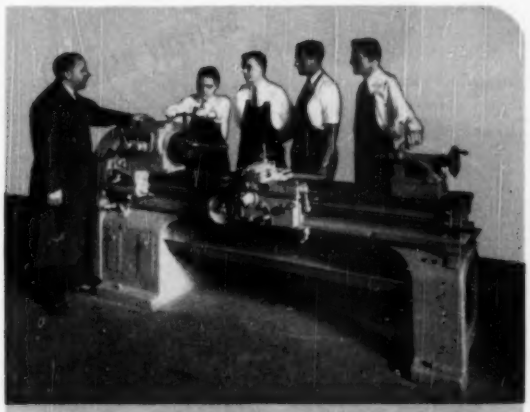
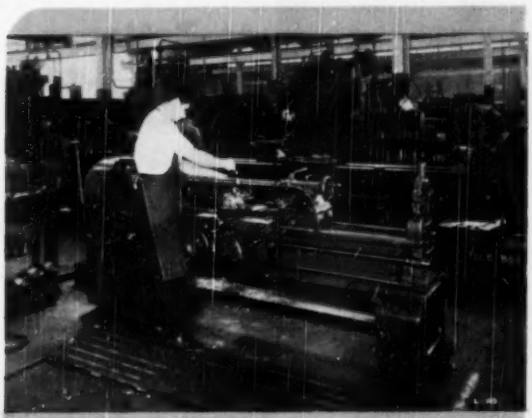


from SCHOOL SHOP



to MACHINE SHOP

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Many outstanding advantages make the medium-priced Sebastian the ideal training lathe. Among its features are: Headstock completely equipped with Timken Roller Bearings . . . Knob control lever for apron longitudinal friction feed . . . Travel safety on compound . . . Motor enclosed in cabinet leg . . . No loose change gears . . . Semi-steel bed . . . Lever on apron for reversing feeds . . . 2-station apron control for start, stop, and reverse of lathe spindle (standard on lathes with 10, 12, and 14 ft. beds).

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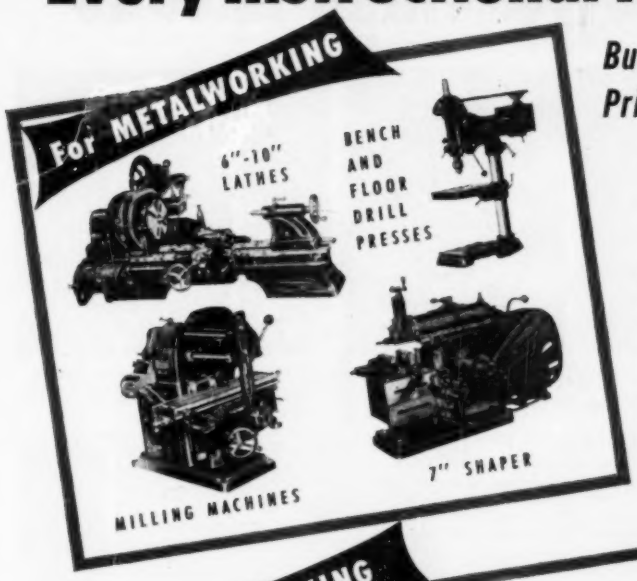

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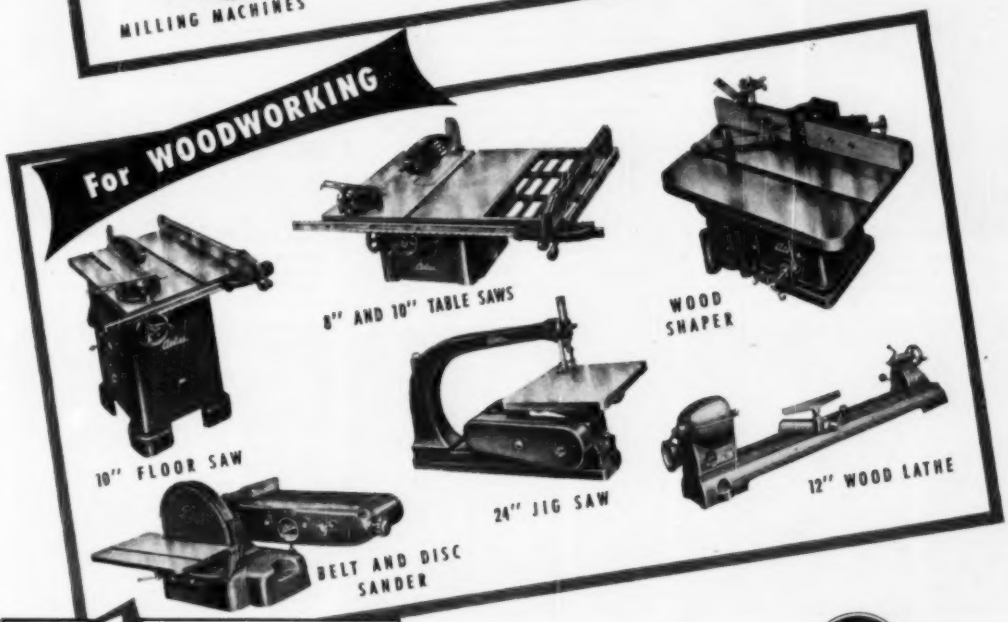
When you make up your equipment requisitions this year, keep in mind these low-cost, industrial-quality tools. Atlas now can provide you with tools for instruction in practically every type of operation in metal or wood — ruggedly, accurately-built tools that can stand inexpert student use and give you years of dependable service. Atlas tools simplify instruction — encourage students to make the most of their shop time.



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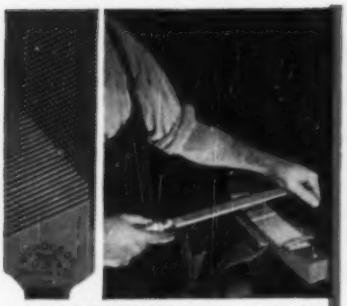

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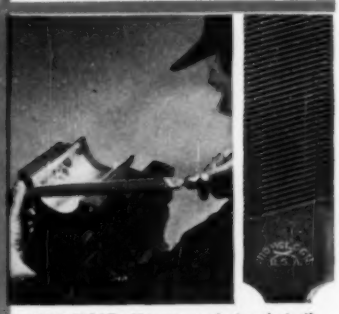

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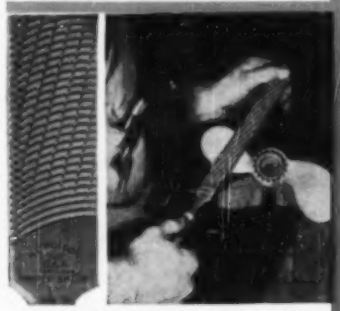

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Season's Greetings

When the reader receives this issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION the Christmas season and the end of the year will be very close at hand. It is time, therefore, to extend our season's greetings and we do it with right good will.

Unfortunately, the nations of the world are still far from being peaceful, and there is much hunger, poverty, misery, and sorrow in the countries that have been devastated by the war.

Unfortunately, too, there is no unity even among those who had joined their forces to gain the victory over the power crazed madman and his henchmen in Europe. Strangely one of the members of the victorious allies, who has, and still is receiving much from our country to preserve his own nation, now makes use of many of Hitler's methods to gain power over smaller countries, and he does that in defiance of all of his former allies, and with utter disregard of all former agreements and promises.

As we wish our readers a very merry Christmas and a happy new year, may we also ask them to join us in a prayer that world-wide peace be established during the coming year, and that all nations will learn to live peacefully and happily together.

Do Not Forget

The title page and index for Volume 37 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is now off the press. If you want a copy, write us and a copy will be sent you.

This Month's Cover

The cover this month shows a student at work in the veteran's rehabilitation department at the Senior High School, Tucson, Ariz. Photograph submitted by Harry A. Goldstein, teacher of photography.

Coming Conventions

Dec. 27–29. Ohio Education Association at Columbus, Ohio. Headquarters, Deshler-Wallic Hotel. Secretary, W. B. Bliss, 213 E. Broad St., Columbus, Ohio.

Dec. 27–31. National Science Teachers and Teachers of Nature Studies, Biology, Research and Science, and Elementary Science, at Washington, D. C. Headquarters, 1201–16th St., N.W., Washington, D. C. Secretary, Dr. Hanor A. Webb, George Peabody Teachers College, Nashville, Tenn.

Dec. 27–29. Pennsylvania State Education Association at Harrisburg, Pa. Headquarters, Penn-Harris Hotel. Secretary, H. E. Gayman, 400 N. Third St., Harrisburg, Pa.

Dec. 28–30. Illinois Education Association at Chicago, Ill. Headquarters, Sherman Hotel. Secretary, Irving F. Pearson, 100 E. Edwards St., Springfield, Ill.

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Industrial Arts and Vocational Education

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JANUARY . . 1949

Liberal and Vocational Education

EDWARD A. FITZPATRICK
President, Mount Mary College
Milwaukee, Wis.

Unfortunately too many interested in a liberal education have set over against a liberal education a vocational education. It is one of those either-or dichotomies. It prevents a real consideration of the problem. Even a person like Professor Foerster says:

> Liberal education is one thing and vocational education another, and no amount of sophistry about liberal education "in a new sense of the term" will alter the fact. That they differ in principle has been recognized from ancient times to the present. As they were apart in ancient Greece, so they were in the Middle Ages, when an education in the seven liberal arts was prescribed for every student before he turned to his professional preparation.

Vocational education must be destroyed! One can almost hear a modern Cato and much lesser satellites of the liberal arts, thundering their "Delenda Est," against the vocational Carthage, and the refrain is always based on the outworn and outmoded phrases of the earlier development. It is true that in our practice the vocational subjects are being "pushed" and a larger number of students are taking vocational subjects, frequently to the neglect of the liberal subjects. The remedy for this is a comprehensive educational theory, which could show that the reinforcing or supplementary roles of all aspects of education might have much to contribute to the education of human beings particularly as a secure foundation to various superstructures. Many things may suggest themselves to an open mind. It might even be shown in some fields, journalism for example, that a liberal education is the best vocational education.

If we start out and define vocational training as merely doing something without having any idea of what we do, that it is merely physical and has no intellectual content or no intellectual method, then it is illiberal, has little educational value, however valuable socially the physical skill may be. To hurl our anathemas at that, and to call down our curses on it, will merely injure or destroy our own definitions, it does not affect reality. Much of our teaching of so-called liberal subjects is in this area of animal training and futile formal training. So calling names or vigorously destroying straw men is a meaningless occupation. Let us open our minds, whatever may have been the definitions of the past, and see — also see into — the problems which face us.

Liberal Education and Vocational Education or Training

The possibilities of the liberalizing effects of some material and some experiences called vocational should not come as a surprise. It is true that the tradition of a liberal education has carried on this antithesis from its origin in Greek society. In Plato and Aristotle, any performance for pay, or for professional use was worthy only of a slavish nature. It was degrading, beneath the dignity of the free man. There is a partial explanation of this situation in the social and economic cleavage of Greek Society, but it has ceased to have meaning in a political and economic democracy, though modern social stratification has other disastrous meanings for education. With us the cleavage is not in the nature of the individual but in the economic status merely. A penetrating analysis of the relation of pay and work for youth in modern society was recently made by Dorothy Canfield Fisher in a report on "Youth and the Future" to which we will return later.

A liberal education for modern men as thus conceived antithetically to vocational education would operate in an economic-social vacuum, in other words, it would be futile. It would be beating in the wind its luminous wings in vain. In the actual order both in its political, social, and economic aspects, its members should after the period of education be economically self-supporting. They should carry their own load socially. It is part of the democratic rejection of all forms of economic and social parasitism. If this is so, then liberal education always presumes a vocational education or a vocational training either in school or on a job.

Liberal Education Used for Vocational Ends

No matter how far back in the development of a liberal education we go, the historical fact is that liberal education was always intimately related to a vocation or itself used for vocational ends. In Plato's *Republic* itself, those trained in the higher branches fitted themselves for the soldier class, for the lesser administrative offices of the state and for the directing head of the society, the philosophers. Similar practical or vocational objectives are found in the "Politics" of Aristotle. In the medieval social order the training was principally for the priesthood, for teaching and less directly for the administration of the Church, of religious orders, of social services, including the political services, and for the gentleman's game of war. In the post-Renaissance period, the liberal education training was still given to those who were to be associated with social control in the offices of government as well as in the directive affairs of the social and economic life.

Before the beginning of the twentieth century this education was received by a very small minority of people and in the seventeenth, eighteenth, and early nineteenth centuries it was practically restricted to men. Though a number of female seminaries were opened in the first half of the nineteenth century, the college education of women did not begin effectively until the founding of Vassar College at the end of the Civil War. The great masses of people, boys and girls, young men and young women, did not receive higher education.

With the Industrial Revolution and the emergence of the democratic forces after the French and the American Revolutions

and well into the nineteenth century the development of the free public education in America and the emergence of a concept of universal school education for social stability, the whole problem of liberal education took on new meaning and new significance. There was special fear that education might accentuate the difference between the poor and the rich, between those in positions of social control and those who were controlled and consequently there was demand for a universal common education. We still retain the idea in the concept of a common school education. With the American people taking seriously the concept of a universal education and trying to achieve it by methods of mass education, including the Lancastrian method, the material of education was extraordinarily expanded and the number of pupils greatly increased. Size and volume came to play too large a role in the educational enterprise at the expense of quality.

Vocational preparation was introduced at all levels above the elementary school and even commercial training was introduced in the elementary school to meet the insistent demands of the industrial, technical civilization for workers. The principal vocations for which American colleges and universities trained before the middle of the nineteenth century were the ministry and the public services. This was often not a specific professional training. It was the kind of intellectual education which the college gave, and which had come down from the Middle Ages at least from the Renaissance. Professional training under academic auspices was a development of the later nineteenth century. It is becoming in more and more fields postcollegiate, that is, after the period of general education. However, it must not be assumed that this ends general education for general education should continue during the period of professional training, and, in fact, inform the professional training itself.

Modern Education Must Be Liberal as Well as Vocational

If there was no other evidence that modern education must be in part vocational as well as liberal the actual practices of all grades of our contemporary schools is convincing proof of our actual philosophy. The surprising thing is that educational discussion and educational theory were emphasizing an irreconcilable conflict between liberal and vocational education, but in every type of educational institution in actual practice these were reinforcing each other. The pathetic thing is that the pressures have become so great under the general ideas of our sensate civilization to promote specific and exclusive preparation for a profession without adequate general education and without continuing general education that basic liberal studies were neglected.

In the actual world in which the graduates of our colleges go the students must possess some skills, some insight, some capacities, and abilities which will enable them to carry on the essential work of the world. Without such work the student's liberal training will not have an adequate field in which to operate and to raise the level of our civilization and the quality of our life.

This setting over against each other of liberal and vocational education emphasizes a point that will be emphasized over and over again in this book. What we are interested in is education; it matters not what adjective you apply to it. Some so-called liberal education may not be education — and may not be liberal, just as it may be a great instrument of human freedom and human culture. This is also true of the liberal subjects. They may be dead and inert as it is too often found in the teaching even of such great subjects as philosophy or Latin, or they may be illuminating to the mind, free the spirit, and give the human being insight into the meaning of that inexhaustible thing called life, so what is called vocational education may be just animal training by cues, and the repetition of monotonous physical activities to acquire skill, or vocational education may really be education. In the study of medicine we come directly in contact with the mystery of life and a deepening respect for it, and in the study of psychiatry we shall learn something of the Creator's "piece of work" and exclaim with Hamlet "How noble in reason — and yet what is this quintessence of dust." Even on trade levels, the proper training for skills will involve much science, some history and a sense of social usefulness and significance. In the evolution of the human race the motivating force was in need, and then developed by reason. Geometry came from surveying and chemistry came from dyeing! The dichotomy is too absolute; the interrelations are too many; both liberal education and vocational education lose by their isolation.

The Industrial Age and Liberal Education

During the whole period of the development of liberal education the characteristic economy of the world was an agricultural economy. In this economy there was a rich experience for all the persons who participated in the life of the farm or the manor, or whatever the form of organization happened to be. Everyone saw a cross section of life in their day-to-day experience. Nearly, if not everybody had certain chores that they must perform. In this way there was a wide contact with actual life and a large experience which would stand the individual in good stead in his later efforts to educate himself.

In our urban and industrial economy a great deal of opportunity of this rich experience is gone. People live vicariously. The division of labor has become so refined that each person has a very narrow range of experience. It is largely a money economy in which each of us performs our little duty and receives money for it in order to purchase the services or things or amusements we want. The basis of experience on which such people interpret life is lacking in this very valuable true experience. They have on the other hand a greater experience of the spectator rather than of the participant type. They take their athletics in the bleachers. They go to the movies to take vicariously their experience. They ride in cars rather than walk. They go to travelogues instead of traveling.

Whatever may be the gains of the modern industrial economy with its tremendous technological advances, there are, educationally speaking, tremendous losses. There is the loss of true experience. There is the loss of the basis for a rich imagination. There is the loss of an experience to interpret great literature. There is a loss to education because by restricting the basic experience it limits the possibilities of development.

When we consider a liberal education for our day and we reject so completely any association with work in education, we forget about this fundamental change in the organization of life. People had this real experience which they do not now have. They follow the whole economy and life of the people in microcosm. They had the possibilities of a genuine development of the intellectual and spiritual life of man as great literature and history opened up the possibilities. We must, therefore, consider more carefully the problem of our industrial society in its relationship to a liberal education.

The Effects of the Industrial Revolution

The terrible devitalizing effects of the organization of industry as following the Industrial Revolution are probably the most obviously revealed in the history of child labor. Probably we cannot enter into the mental attitude which had children work in coal mines for 12 hours a day or some such theory that work kept them occupied, out of danger, and out of delinquency and would make them good

citizens. Robbing the child of every opportunity for growth in the period of his greatest plasticity is the tragic educational fact. Denying them every condition of healthful environment, with sunshine, fresh air, play, and the other recreations are merely other factors in the picture. Slums and blighted areas become the child's environment with every temptation of evil. The depths to which such children may descend for example was described by General Booth of the Salvation Army in his "Darkest England" which was reviewed by Francis Thompson in 1900 in this langauge:

> "If Christ," says Francis Thompson,* "stood amidst your London slums, He could not say: 'Except ye become as one of *these* little children.' For better your children were cast from the bridges of London than they should become as one of those little ones" (p. 64). Specifically he describes these destitute children: "They know evil before they know good, that the boys are ruffians and profligates, the girls harlots in the mother's womb. This, to me, the most night-marish idea in all the nightmare of those poor little lives" (p. 54). The region in which they live is described: "A region whose hedgerows have set to brick, whose soil is chilled to stone; where flowers are sold and women, where the men wither and the stars; whose streets to me on the most glittering day are black."

The factory with its terribly long hours in its early development, its disregard of every protection of human health and human morality and human life is the symbol of what industry meant to adults. It is no wonder that there was revulsion from such a way of life. It was depersonalizing, demoralizing, and dehumanizing. It is no wonder that the public house and the tavern was the inevitable place for a little recreation and rest from the fatigue of labor in the factories. Nice people did not work in factories, they owned them and lived off the exploitations of the lives of other human beings. There was no need for training or education for this life. People went into it early, acquiring by practice the routine of the factory and living its life to the end of their days.

The surprising thing is that people with a so-called liberal education or humanistic education did not see in these children and in these adults their fellow human beings who might be raised above their present levels by an education which opened up to them the possibilities of human nature. Give them dreams and visions of a better life and meet problems through what has become social welfare agencies to alleviate at least the condition of such people. But there was no such bond of sympathy or understanding and those calling for a liberal education really looked with disdain on all these "inferior" people who did the work of the world providing the goods for the good life of these people and made possible their ostentatious expenditures. This kind of life not only has no significance for a liberal education, but it does not belong in any phase of human civilization. It becomes the responsibility of those who are truly educated to see that these people get a worthy conception of human life and that conditions make possible some progress toward the achievement of such a life. There is an interesting sentence in the Harvard Report on the situation in Greece and Rome. It says "to the extent that cultural civilization failed to mitigate the evils of disease, squalor, and a general low level of living among the rest, to that extent it failed to liberate man" (p. 59).

This identical sentence may be applied to what is called modern civilization except that the conditions were very much worse and the indifference toward it was, if anything, greater. It was not until well after the middle of the nineteenth century that the humanistic impulse became dominant and the human possibilities of these workers were given an opportunity to develop.

The Ultimate Purpose of Industry

One of the greatest needs of modern society is a radical change of view toward the whole industrial phase of our life. The increasing amount of leisure is an indication of a deeper thing that is happening. There has been a progressive movement to reduce the number of hours that all people work in practically all phases of industry and vocation. It is a great change from a 12-hour day, 7 days a week, to a 5-day week with a total of 40 hours. This whole movement has been achieved, we might say, within the past generation from economic motives more so even than from humanistic motives. The reduction of the amount of time in factories, in shops, and in other places where men work to produce things that men need is an indication that we are ready for a more humanistic view of the function and problems of vocation in our modern society. Such a change of view is already indicated at least in occasional publications of the American Federation of Labor and the National Association of Manufacturers. One finds in the labor group a statement that the problem of vocational education in its lower levels must not be so much training for industry, as training for life in an industrial society, and the national manufacturers at one time said "vocational education is not teaching for an occupation only, it is the making of men and women." There is no indication that these recommendations, insights of labor and management, were really thoroughly understood by the generality of the followers, and there has been no consistent program through the years to carry them into effect, but one of the great social things now to be done is to make real these conceptions of vocational education and the very much more difficult job of carrying into actual industrial organization these humanistic conceptions.

Even though we do not see immediately the possibilities of a great society, we must look beyond the assembly line and the monotony of the high specialization of modern industry to a society where human beings will find in their work the highest human satisfactions. It is a terrible thought that in the making of the things which we need for a high standard of human life hundreds of thousands of people must submit themselves to a day to day grind in processes that are depersonalizing and dehumanizing while any return to the older economies is not even conceivable. We must realize that in the old apprenticeship days with the making of the masterpiece by the apprentice, his becoming a master himself, there were human satisfactions in work that a great deal of modern work does not permit.

We should aim to make the production of socially necessary things an organized educational experience. It would seem almost a perverse and malign social order if men had to sacrifice themselves in loss of health, devitalization and dehumanization, in the production of things which we all need. On the contrary, it would be a well-ordered and benign social organization if men in the rendering of essential social services were raised out of the level of deadening routine, were touched in their imagination, had the vision to realize the social good they were doing. That would be truly the Great Society. In it industry would be helpful in the spiritual formation of men. It would be educative in the broadest sense. Work would become education. This goes back to the old monks who adopted as their motto "that labor is prayer."

Most important is the development of new social policies that aim to conserve the humanity of the worker. If the tendencies described develop further, then the industrial processes of our society are a necessary evil, and human beings should spend as little time in them as possible. Here is the educational basis of the five-day week and the six-hour day. But all labor or work need not be of this character; we trust our social leadership will recognize that.

Human labor is not a commodity. It is

*The Works of Francis Thompson: Prose, published by Chas. Scribner's Sons, 597 Fifth Ave., New York, N. Y.

no part of the merely dead materials of industry. It is no part even of the wonderful automatic machinery of modern specialized industry. Its precious life must be conserved. Its potentiality for education must always be esteemed uppermost by the individual in the guidance of his own life as well as by the government and industry in its social aspects. The human being is an end, not a means — either for government or for industry. The ultimate purpose of industry as of all social machinery is to make better men and women, whatever be its proximate end, bathtubs, furniture, food, carpets, farm machinery, or what not. Even for its more immediate object — the making of things, it would be more successful if it kept in mind and was guided by the humanistic point of view.

Work, the Worker, and Education

This discussion of education in an industrial or technological society raises the fundamental question of work or experience in education itself. It is a revival of the older problem of manual training in a new frame of reference. Let us call some witnesses on the present and changed outlook. Dewey long ago described education as the reorganization of experience and he thus expressed a very fundamental truth of education that our individual experience is the raw material of our education. It is put more simply in the principle: there is nothing in the mind that is not first in the senses. Thus experience needs continual revising, renovating, reconstructing, and even regenerating. And need we say, that its basic content should be progressively enlarged or *enriched*. In the spiritual life there is a series of verbs that express the same idea perhaps even more effectively.

In a rather striking book, "Bill's School and Mine," that made no particular impression on educators, a professor at Lehigh University, William S. Franklin, describes his school on the plains of Kansas with the school of any of the boys in the town of Bethlehem, Pa., where Lehigh University is located. Franklin describes enthusiastically his boyhood days as follows:

> I always think of my school as my boyhood. Until I was big enough to swim the Missouri River my home was in a little Kansas town, and we boys lived in the woods and in the water all summer, and in the woods and on the ice all winter. We trapped and hunted, we rowed and fished, and built dams, and cut stick horses, and kept stick-horse livery stables where the grapevine hung, and where the p paws mellowed in the fall. We made mud slides into our swimming hole, and we were artists in mud-tattoo, painting face and body with thin black mud and scraping white stripes from head to foot. We climbed the trees and cut our names, we sucked the sap of the box elder and squashed poke berries for war paint. We picked wild grapes and gooseberries, and made pop-guns to shoot green haws. In the autumn we gathered walnuts, and in the spring we greeted the johnny-jump-ups, and the sweet Williams as they peered through the mold (p. 3).

That was his school and he puts in contrast with it the magnificent building which is Bethlehem Bill's school with its accredited teachers and all the modern externals of education. He says about Bill's school:

> Bill, little Bethlehem Bill, has a better school than I had; the house and the things that go with it. Bill's teachers know more accurately what they are about than did my teachers in the old days out West half a century ago. And, of course, Bill is getting things from his school that I did not get. But he is growing up with a woefully distorted idea of life. What does Bill know about the woods and the flowers? Where in Bill's make-up is that which comes from browsing on berries and nuts and the rank paw-paw, and roaming the woods like the Banderlog? And the crops, what does he know about them? (p. 4.)

And emphasizing the social aspects of education he points out the further fact that it is unlike the great Kansas outdoors:

> Bill's fine schoolhouse and splendid teachers, and Bill's good mother are not all there is to Bill's school. No, Bill's school is as big as all Bethlehem, and in its bigger aspects it is a bad school, bad because Bill has no opportunity to play as a boy should play, and bad because Bill has no opportunity to work as a boy should work (p. 21).

A great deal of the antagonism to vocational education is misunderstood as antagonism to experience in education. One of the great things we need to learn is the place of *work* in the individual and in the social life and consequently its place in education. There was a remarkable study by the American Council on Education called "Youth and the Future" in which the body of work is in sharp contrast with the extraordinary chapter at the end of it written by Dorothy Canfield Fisher. What ought to have been the main interest — which is not included in the body of the work — is the independent interpretative conclusion of the situation at the end of the study. In the conclusion, Miss Canfield points out the devastating effect of our emphasis on money and the consequent creation of a moral atmosphere which paralyzes the natural instinct of youth to enjoy creative activity. If youth cannot be paid for something they feel that it is not worth doing and this is tied up intimately not only with the leisure of unemployment, but the normal leisure of reduced hours of work time. They had no money and consequently they could make no useful or enjoyable use of their leisure time and in this unwritten but unescapable syllogism they were imprisoned. They drifted helplessly passive in a vacuum of idleness. The net result "is the psychological misery of biologically crammed individuals." The description of youth in contemporary literature revealing the reckless speed, fitfulness, sexual unrestraint, and alcoholism indicates that they do not dream that opportunities for constructive work exist. The oldest motive power in humanity, the continuous compulsion of material necessity has gone and man has not imagination enough to utilize his creative impulses.

Walt Whitman in "American Vistas" saw the need to redeem the lives of men and women from their social trivialities and frivolities, and he expressed the need for a literature not concerned with mere technicalities and techniques, but "a literature underlying life, religious, consistent with science, handling the elements and forces with competent power, teaching and training men — and as perhaps the most previous of its results, achieving the entire redemption of women out of these incredible holds and webs of silliness, millinery and every dyspeptic depletion, and thus assuring to the States a strong and sweet female race, a race of perfect mothers" (p. 315). So Liberty H. Bailey, for a period nearer to ours, describes the life of women in "What is Democracy?" He says:

> The staggering burden for a democracy to carry is the triviality of the life of women. As a whole, these lives are filled with very small affairs and have little outlook beyond their immediate circumstances. The habitual conversation of women reveals this sterility: it is mostly of small personal matters.

He continues for the period after World War I: "They are free to continue in their vacuities and frivolities." And adds "But the unconcerned ornamental women who feel no responsibility for the burden of the world's pain constitute in themselves a real problem in democracy." We have not been making substantial progress. In our day some have found resource in careers and helping to do the actual work of the world and others have relapsed into the more futile and sterile life of cocktail parties and bridge playing.

One is surprised to pick up the Harvard Report and find in it a suggestion that work is an essential part of the human being's preparation for a general liberal education. In the section in which it announces it will discuss shop training in

general education it goes on to point out that lack of shop training is a serious deterrent to entry into all types of technological work and to college and post-graduate training in science, medicine, and engineering. This shop training should include not only simple hand tools, but also the operation of drill presses, wood and machine lathes.

The promised discussion points out how necessary and helpful shop training is to students having only verbal training — which is characteristic of most education. This kind of training must be secured, if possible, on the secondary school level, or it will have to be obtained somehow in or out of school, in secondary school or college, if realism is to inform verbalism. This striking sentence is included in the discussion:

> The direct contact with materials, manipulation of simple tools, the capacity to create by hand from a concept in the mind — all these are indispensable aspects of the general education of everyone.

Perhaps even more surprising still is to find Jacques Maritain in the Terry Lectures at Yale on "Education at the Crossroads" say a substantially similar thing. On the basis of a fundamental rule that education must tend to unify not spread out, to foster the internal unity of Man, Maritain discusses work in education. The need for training of hands and minds is accepted for childhood, is valid for youth, and is being recognized for high school and college. "There is no place," says Maritain, "closer to man than a workshop, and the intelligence of a man is not only in his head, but in his fingers, too." This manual work makes for psychological equilibrium, it furthers the ingenuity and accuracy of the mind, and is the prime basis for artistic activity. It anticipates the world of tomorrow where the dignity of work will be recognized and the distinction between *homo faber* and *homo sapiens* will be done away with. This position implies that education that begins with experience must complete itself in reason. Both are essential. The emphasis of either at the expense of the other will not produce integrated minds. Maritain says: "Neither those empiricists who despise abstract reason, logic, and the conceptual insights of intelligence, nor those nationalists who ignore experience, are integrated minds."

What is needed is an entirely different and new philosophy of work in its relationship to human life and to education as distinct from its relationship to production. It might be added even in that area that a different philosophy of work would be helpful where industry has conceived as the ultimate product of the factory not the material object but its effects on the human life of the worker. It is even conceivable that greater production would result from concentrating more definitely on the human objective. Perhaps such a philosophy is best summarized in Mumford's "The Conditions of Man" in the following words:

> Man gains, through work, the insight into nature he needs to transmute work into artifacts and symbols that have a use beyond ensuring his immediate animal survival. The ultimate justification of work lies not alone in the performance and the product but in the realm of the arts and sciences. The *role* of work is to make man a master of the conditions of life: hence its constant discipline is essential to his grasp of the real world. The *function* of work is to provide man with a living: not the purpose of enlarging his capacities to create. The social meaning of work derives from the acts of creation it makes possible.

We need to substitute the positive notion of the supplementary and reinforcing character of liberal and vocational education for the present antithesis. The general or liberal education of an individual begins at birth and ends only with his death. It must continue through all stages of his formal education and if this is good education it will continue through the rest of his life. All genuine good education makes for the better workman in his understanding of his place in society, his relation to his fellow human beings, his place in the economic system. It would obviously be a difficult thing in the training of a priest and minister to make any sharp line as to what is his vocational and his general education. It would be so with the lawyer and it is even so with the workman. Intelligence is a vocational asset no matter what the vocation and intelligence is primarily an objective of a liberal education. Liberal education, says Norman Foerster, is one thing and vocational education another, and no amount of sophistry about liberal education in a new sense of the term will alter the fact. That they differ in principle has been recognized from ancient times to the present. There is no doubt that a liberal education and a vocational education are different things, but they are things that must happen to the same individual and be related in the same individual personality. For the purpose of intellectual analysis, as in all science, it is a good intellectual tool to define your terms and stick to your definitions. It is quite another thing in the human process of education in forming an individual to keep your intellectual definitions for your analysis, but not to impose them upon the actual living human being. We have already indicated that liberal education can be as deadening, as futile and sterile as any kind of education with any name whatever. There is a kind of vocational education that may free the spirit and inspire the worker with a new vision of man and his possibilities.

School Shop Safety in the Teacher Education Program

G. BAYSINGER
Wayne University
Detroit, Mich.

In school shop safety, teacher education recognizes its responsibilities to the university student and to the future teacher. We are concerned with prevention of injury to the student in shops and laboratories while he is a student, and we are concerned with preparing him to meet his responsibilities as a teacher to students in the school shop and home workshops, and to his students as future wage earners and future homeowners. These two safety programs have individuality but overlap. They are not conveniently disposed of by a course in safety education but continue through the undergraduate program as an integral part of manipulative and professional courses. The content of school shop safety is probably the same in most teacher education programs but names of topics and methods may differ. Wayne university's program, however, illustrates this overlapping of the two programs and the integration of safety instruction.

The University Student

Health service facilities, available to every student, are concerned with keeping the student well and providing emergency treatment when he is injured or ill. When an injury occurs, our instructor gives first

An industrial safety engineer discusses safety with a work-experience group

aid and sends the student to health service. If the student is seriously injured, he is taken directly to the nearest hospital. If he cannot be moved, the instructor calls the police department for an ambulance. (As a municipal university, Wayne uses shops and laboratories of the Detroit public schools most of which are off the campus and may be at some distance from health service.)

Instruction in safe work habits and in the use of personal protective equipment are a part of all manipulative courses. Demonstrations, films, posters, charts, and booklets are used. While at work, the student is under constant supervision of the instructor; no student is permitted to work in the shops unless the instructor is present. Courses include gas and electric welding, foundry, machine shop, auto mechanics, aeronautics, cabinetmaking, refrigeration, electrical construction, in addition to the low-hazard, hand tool courses. Safety instruction is aimed both at preventing injury to the university student as a student and at preparing him to assume his responsibilities as a teacher.

Electrical hazards in the school shop, home workshop, and the home, are given special consideration in the first course in *electricity* which all students take.

Accident prevention in the home, and equipping the home workshop, are two of the topics discussed in *household mechanics*, a basic course required of all students.

Progress reports are made twice a year by the instructor for each student in all basic courses. Of the 13 factors considered in this report, 3 are concerned with safety: attitude toward safety, housekeeping, and conduct.

Attitude Toward Safety	*Disregards safe practices*	*Takes unnecessary chances*	*Always follows safe practices*	*Exceptionally safety conscious*
Housekeeping	Poor housekeeper—careless in disposalof refuse	Keeps work station neat only when urged	Usually has tools arranged orderly — tidy	Always keeps work station neat and tools arranged efficiently
Conduct	Has annoying personal and work habits	Too sociable — wastes time	Standard of conduct acceptable	Pleasing, cheerful, dignified

The chairman of the department holds a conference with any student who receives a low rating. If no progress results, the student is advised to consider another curriculum.

Future Teacher

A first aid course offered by the department of physical education is required of all industrial-education majors.

Psychological causes of accidents is one of the units studied in *industrial psychology*.

History of industrial safety with emphasis on industrial accidents as a risk of the worker is one of the topics in *industrial sociology* and *labor problems*.

Facilities and work of the National Safety Council is discussed in one of the methods courses, and posters, publications, and other materials are displayed.

Responsibilities of the department of safety engineering of the public schools are presented in a methods course by the safety engineer of the Detroit board of education. He discusses safety regulations, inspection, accident reporting, and points out particular situations in the school shops in need of emphasis. Because many of the teachers accepted for placement in Detroit are Wayne graduates, data from accident reports serve as a means of evaluating the effectiveness of the teacher education program of school shop safety.

Teacher injury receives attention in a methods course. School liability, reporting teacher injury, and group insurance plans are discussed. The teacher's rights under the social security act and workmen's compensation laws are adequately covered in *labor problems*.

Teacher liability is discussed in a professional course. Laws in various states and liability insurance are topics of considerable interest.

Survey of industrial education in Detroit, a two-hour required course, consists of a series of guided field trips to various shops. Among items students are primed to observe are arrangement of machines and equipment, color treatment, use of color code, housekeeping, machine guards, and the safety program.

School Shop Planning, with emphasis on effective arrangement of machines and equipment on the floor plan to provide a safe environment, is given considerable attention in a methods course. Because of the growing importance of the topic, we are now planning a new course to be added to the curriculum.

Review of texts and visual aids in safety education is an assignment in a methods course. The student is asked to select material to be used in the area in which he expects to teach. Special attention is given to films, particularly those produced by the Jam Handy Organization which, incidentally, were developed in co-operation with Wayne University.

The safety objective of the aims of industrial education, "To develop safe work habits and attitudes of respect for hygiene and safe practices in the preservation of human resources," is given attention in *course of study construction*.

Identifying hazards in manipulative operations is a regular part of the procedure in analyzing an operation. *Job, trade, and activity analysis* is a required course.

Planning a safety program in the area in

which the student expects to teach is an assignment in one of the methods courses. The future teacher is helped to see shop safety as a total program built around the student safety engineer.

Developing safety instruction as a part of student planning is demonstrated and discussed in a methods course. When the instruction may also apply to the home or home workshop, the future teacher is taught to make that application. Use is made of the student planning book for instruction in basic safety, and in developing safe work habits concerned with the project being planned.

Developing responsibilities of the student safety engineer, is demonstrated and discussed in a methods course. Originating in Detroit, the student safety engineer idea is a recognized part of the safety program in all Detroit school shops. The job of the student safety engineer is considered to be the operation of the routine part of the shop-safety program.

First aid materials, their use, contents of a first-aid cabinet, maintaining a supply of materials in the cabinet, and keeping the cabinet clean, are discussed in a methods course. Although this instruction is intended primarily for schools, we are also concerned with the first aid materials in the home, particularly the home workshop. First aid for most frequent school injuries is reviewed and demonstrated.

Use of the fire blanket is covered in the first-aid course but it is reviewed in manipulative courses where open flames are used. A fire blanket is standard equipment in such shops.

Safety bulletin board is one of the topics discused in a methods course. The future teacher is taught to select posters and other display material to parallel the safety instruction being studied at the time, and to file the planned display for later use.

Reporting student injuries, first discussed by the safety engineer of the Detroit board of education, is reviewed in a methods course. Future teachers observe simulated *accidents,* write their reports, and discuss them.

Conducting a fire drill is another topic in a methods course that was originally discussed by the safety engineer. Later, arrangements are made in *student teaching* for each future teacher to conduct a fire drill under classroom conditions.

Use of fire extinguishers is demonstrated in a methods course. Types of fire extinguishers are shown, safety precautions are explained, and their use demonstrated.

Integration of the various phases of the school-shop safety program is accomplished in a methods course. Discussion ties together subject matter content scattered over four years of work, thus helping the future teacher orient himself in the field of safety education.

Wayne University uses shops of the Detroit public schools

Supervised student teaching in a public school shop under a carefully selected and trained critic teacher gives the future teacher opportunity to practice what he has learned. The situation in which he works is not a training-school shop but a regular school shop, and he is assigned the responsibility of one or more classes for a semester. Under the critic teacher's supervision, he performs all of the activities of a regular teacher. Planning and administering a safety program, conducting a fire drill, planning safety instruction, and so on, are included. Nine hours of student teaching are required of all students.

A work experience program, optional, provides industrial experience in which the student becomes familiar with industrial safety programs. He is taught safe work practices on various production and toolroom machines as a regular part of the training program. The safety engineer of the corporation meets with the co-operative students and discusses various phases of the problem of accident prevention in industry, compares industrial with school shop safety, and suggests ways that schools can co-operate in solving the accident problem.

Summary

Teacher education is concerned with the safety of the university student and with the preparation of the future teacher. Responsibilities of each overlap.

Instruction is not tacked on the curriculum but is built into manipulative and professional courses. The extent of instruction depends on facilities. The purposes of teacher education are to prepare the teacher so that he can assume his responsibilities for the safety of students in the school shops and in home workshops, and his responsibilities to students as future homeowners and wage earners. Teacher education, as the training agency, assumes a major part of the responsibility for "developing safe work habits and attitudes of respect for hygiene and safe practices in the preservation of human resources."

Apprentice receiving instruction on the LeBlond No. 2 toolroom lathe

Industrial Arts and Vocational Education
John J. Metz, Editor

SCIENTIFIC ADVANCES NOT UNMIXED BLESSINGS

It has been discovered that cuts caused by broken fluorescent lamps produce wounds that heal very slowly, and that some will not heal until one or more surgical operations have been performed to remove the tumors and dead tissue that may result.

The National Building Owners and Managers Association advises that such cuts be given medical attention immediately. It has not been determined definitely whether the paint used to coat the inside of the fluorescent lamp tubes is the cause of the tumors and watery discharges which accompany wounds caused by the broken glass from these lamps. This paint contains from 1 to 4 per cent of beryllium phosphor. Whether it is this material which is the cause of all the trouble has not been proved as yet. However, it is well that teachers call the attention of their students to such reports as the following:

Four cases of fluorescent lamp injury were reported and discussed by Dr. C. F. Shook, medical director of the Owens Illinois Glass Co., Toledo, Ohio, in the October issue of *Industrial Medicine*. A woman employee of his firm's Marion (Ind.) plant was cut on the left wrist when an overhead fluorescent tube dropped from its sockets and shattered. That was in September, 1947. The wound did not heal until May, 1948, and then only after surgery. The cut had been dressed first by another woman trained in first aid and had not been seen by a doctor until much later.

The woman's cut would heal slightly. Then it would keep breaking down.

The case was reported to pathologists at Harvard University and at the Saranac Lake (N. Y.) laboratory because of work being done at those places in studying beryllium injuries. Dr. Robert S. Grier of the Harvard cancer commission disclosed three similar wounds from broken fluorescent tube glass.

The foregoing is reported here, merely to call the teachers' attention to the necessity of warning students not to break up discarded fluorescent lamps, and to be very careful how they handle the glass from lamps that have been accidentally broken.

We all know that the fluorescent lamp is a great step forward in electric lamp manufacture. The discovery, however, that it has some defects, must urge the scientists to overcome them. This is being worked at already, as some lamp manufacturers have begun to experiment with synthetic nonmetallic powders to replace beryllium.

WELDING AND FIRE HAZARDS

The welder, besides knowing the art of welding metals, must also bear in mind that the torch in his hand is a potential means of destruction if it is not handled carefully. Every welding or cutting operation must be planned with both of these objectives ever in mind.

The first thing, then, is to check the fire hazards of the location where the welding is to be done. There are some places where an open flame is not permitted; hence, the work to be welded must be removed so that the welding can be safely done. If it cannot be moved, then the flammable material and all rubbish must be removed from the vicinity of the place where the welding is to be done. If this cannot be done either, metal or asbestos guards should be placed so that the sparks cannot start a fire.

Another thing which the welder must consider is the distance sparks can be thrown by a cutting blowpipe when the pressure of the gas is greater than that which should be used. From tests made by the Linde Air Products Company, the correct pressure of thirty-five pounds, with the cutting tip seven feet above the floor level, the extreme distance sparks would fly is sixteen and one-half feet. With the tip in the same position, but with gas pressure doubled, the sparks would fly twenty-six feet. At a hundred pounds gas pressure, the sparks would fly thirty-four feet.

This shows that proper gas pressure is both safer and more economical.

Welders must be trained to do their work safely. They must bear in mind always that they are handling exceedingly dangerous equipment, and that every precaution must be taken to safeguard persons and property.

ANOTHER FIVE YEARS

As we are entering the new year it may be permissible to stop for a moment to see what INDUSTRIAL ARTS AND VOCATIONAL EDUCATION has accomplished. Probably the first thing that ought to be mentioned is that it has finished the thirty-fifth year of its existence.

During all of this time, the magazine has striven to follow the course laid out for it by its editors when they launched it in 1914. They stated their aims in the first issue of the magazine in the following manner:

"*The Industrial Arts Magazine* shall stand for the united arts, reaching out in manifold ways to accomplish one great aim. This aim embraces not alone the preparation for financial returns from industrial work, but also the preparation which the duties of efficient citizenship demand. This publication shall recognize some distinction, but certainly no conflict between manual training and vocational education. In each issue of the magazine, we hope not only to reach the leaders, but to present something which can be appreciated by the newcomers and which will be of the greatest advantage to the average teacher. The expert, who is far in advance of the procession, must bear patiently some of the more elementary discussions, and the newcomer must adjust himself to the idea of learning more than the mere elementary material."

Great credit is due to our contributors who have made it possible to adhere strictly to the course outlined for the magazine. During the past five years the magazine has furnished its readers with 2242 pages of professional reading matter composed of 550 articles of general matter, 64 articles on tests and testing, and 929 articles on projects and problems.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION thanks all who have furnished this large amount of material for the betterment of their profession, and it is equally thankful to the readers who have continued on our subscription list so faithfully year after year. It takes both writers and readers to help the teaching profession grow and prosper, and the editors and publisher of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION promise to do their utmost to make their magazine a true medium for the upgrading of the teachers and the subjects which they teach.

Some Leaders in Industrial Education

WILLIAM T. BAWDEN
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(*Continued from page 400 of the December, 1948, issue*)

Dr. L. D. Harvey and The Stout Institute

With the reorganization of the Stout educational enterprises, in 1903, under the direction of Dr. Lorenzo D. Harvey, who was also appointed superintendent of schools by the Menomonie board of education, a new era began. The name, Stout Manual Training School was dropped, and under the new title, the Stout Training Schools, increased emphasis was given to the work of preparing teachers of manual training and domestic science.

The personal relationship thus established in Menomonie was most congenial to both Mr. Harvey and Mr. Stout. On the one hand, it is not often that an educator is called to a responsible post such as this was, with not only the opportunity but the encouragement to experiment in a new and relatively untried field, with the assurance of ample and sympathetic financial backing. On the other hand, it is not often that a philanthropist interested in exploring new possibilities in education is so happy in his choice of associate and adviser in the working out of his plans. Each man had unbounded confidence in the other. Each man supplemented the other to a remarkable degree.

The inspiration for the enlarged scope of the institution was a conviction that had been forming in Mr. Stout's mind for some time that there was need for a larger supply of well-trained teachers in these lines than was afforded by sources then in existence. As already indicated, the facilities of the Stout schools for manual training were not fully utilized by the local needs, and the opportunity was at hand for engaging in the broader field. The reorganized Stout Training Schools opened in September, 1903, with two students in the manal training department and 23 in the domestic science department, all of whom sought preparation for the work of teaching.

Dr. Harvey's work in Menomonie attracted attention that soon became nationwide. In the March number, 1904, *The World's Work*, New York, contained an extended article on "The Ideal Schools of Menomonie" by Adele Marie Shaw, in which the writer said: "At the head of the Menomonie school system, Dr. L. D. Harvey, former president of the Milwaukee Normal School and lately state superintendent, is making a remarkable power of organization felt in the life of the whole system." The article emphasized in addition to Dr. Harvey's ability as an organizer, his extended and successful experience in responsible positions, his profound knowledge of modern educational needs and the means requisite to meet them, and the practical soundness of his approach to the study of educational problems.

Because of the discovery that manual training and domestic science were being introduced into the high schools of Wisconsin and neighboring states more rapidly than qualified teachers could be found to direct the work, it was decided that the time was ripe for another advance in the standards of qualifications demanded of teachers. Acting on this conviction, two-year curricula were set up in 1905, based on graduation from four-year high school. In addition to the equipment in the Stout schools, the board of education made available the well-equipped science laboratories and other facilities of the high school.

School for Homemakers

In 1907, another significant feature was added to the program by the organization of a department designated the Homemaker's School. Dr. Harvey had been contemplating this step for some time because of the importance of preparation for family life. "He was one of the first to conceive of the family as a subject of equal importance with the state in school curricula, and insisted that in building and arranging a home, scientific, artistic, and ethical conditions are involved." The subjects studied in this department included: the house and its arrangement, furnishings, and equipment; study of foods, selection, preservation, preparation, and serving; clothing and household fabrics; care of children; home nursing and emergencies; home financing, family budgets, and social economics. The general purpose was stated to be the fitting of young women to organize and manage their homes intelligently in all the relationships among the individuals within it, and in the relationships to society of which it is a part. "This course was a fundamental contribution to the advancement of education."

Trade School Department

For a number of years Dr. Harvey had been aware of a growing demand for skilled workers in various mechanical trades. This demand was not being met adequately under the apprenticeship system, and furthermore he believed it possible to organize trade classes to do the job more thoroughly, more efficiently, and in less time. He observed that the apprenticeship plan depended on foremen and other workers to supervise the progress of the young learners. Often these men lacked the necessary qualifications, and seldom possessed the interest and enthusiasm needed for an effective job of teaching. He believed, further, that skilled teachers, in a school adequately equipped and organized for the purpose, could accomplish something that the apprentice system often neglects, namely, give the prospective worker a command of certain related science and technical knowledge, and some ability to apply that knowledge through modern and improved methods.

In order to carry these ideas into effect, Dr. Harvey organized a Plumbing and Bricklaying Trades School in 1908, having decided to make a beginning with the building trades. This course was successful from the beginning. Capable teachers, adequate equipment, efficient organization, and sound methods of instruction soon demonstrated the validity of the plan. Graduates found employment readily and were able to command good wages immediately.

A Philosophy of Education

Dr. Harvey's biographer, Patzer, identifies nine "fundamental propositions relating to education" that were influential in the evolution of plans, policies, and curricula in Menomonie. In condensed form they read as follows:

1. Impression to be effective must be followed by expression; impression may come from sources other than books; expression may take other forms than that of words and other symbols; these added types both of impression and expression have values

in training which, if not actually superior, are at least not excelled by the older and traditional types of training.

2. After leaving school, the child will be concerned with activities and things rather than with books; with what men do, and with what he is to do, rather than with what men say; and very much more with what men do and with what is to be done today, than with what men said and did a thousand years ago. Therefore, the training in school which will early put the child in touch with things, and which requires activities essential in dealing with those things, is a kind of training which directly fits him for his later work in life.

3. Much of what the child ordinarily acquires in school has little value as knowledge; whatever of gain there has been in its acquisition was in the effort put forth, and in the resulting effect upon the individual in increased capacity for similar effort. Many of the facts which make up the body of knowledge ordinarily required may safely be omitted from the work of the school, and in place of the work necessary for their acquisition, there may be substituted a training which is essentially doing, and which will play a larger part in the subsequent activities of the child than would a knowledge of the omitted facts.

4. Mental training results not solely from a study of what others have done and said. In the determination of what is to be done today, of how it shall be done, and in the control and direction of physical activities employed in the doing, there is a kind of mental training that is unsurpassed in value by any other as preparation for any life career.

5. The public school system is under obligation to adjust its curriculum and methods of instruction to the fact that more than 90 per cent of the graduates of the elementary school subsequently earn their living by the work of their hands. It is imperative to provide some training of the hand, some training of mind through the training of the hand, and some training in the recognition of the nobility of manual labor controlled and directed by mental activity to useful ends.

6. Intelligent, systematic, and persistent physical training is essential to the all-round development and well-being of the individual.

7. In addition to mental, manual, and physical training, there should be appropriate development of the aesthetic sense. Appreciation of beauty in form and color, of harmony and fitness in dress and in the decorations and furnishings of the home, appreciation of music, and other acquisitions contribute to the comfort, usefulness, and happiness of the individual.

8. The habit of reading, and a taste for reading that which is good in literature, should be developed in every individual so that he may find it possible to bring his mind in touch with the minds of the great thinkers of all times.

9. The public schools should strive intelligently, actively, and persistently for the creation of right ideals and the development of good habits.

In order to make available to all children the advantages of schooling such as those contemplated in this outline of principles and policies, it is necessary to provide the requisite buildings, equipment, and trained personnel. Dr. Harvey urged continually the necessity for more adequate financial support of public education.

Stout Institute Becomes Independent

Beginning in 1903, when Dr. Harvey took over the direction of the Stout Training Schools, and especially after 1905, when two-year curricula were established for the preparation of teachers of manual training and domestic economy, there was a steady increase in enrollment. In accordance with the financial arrangements, the board of education maintained and operated the high school from municipal revenues, except that Mr. Stout personally provided the funds for payment of salaries of the special teachers of manual training and domestic economy. Students who enrolled in the special teacher training courses paid tuition fees. These fees were never sufficient to meet the cost of operation, and the deficit was made up each year by Mr. Stout.

It soon became evident that a new plan of organization would be advantageous, both to the community and to the Stout Training Schools. With the continued growth of the latter there would naturally be increased expenditures for maintenance. Also it was foreseen that additional buildings and equipment would soon be needed, far beyond what it would be reasonable to expect the board of education to provide out of community funds. In conferences among members of the board of education, Dr. Harvey and Senator Stout, it was decided to adopt a plan of organization in accordance with which the teacher training program and other special features of the Training Schools would be entirely separated from the city school system, and carried on independently. On the other hand, it was provided that the city board of education would be responsible only for the administration and maintenance of the work in the elementary schools and high school.

Details of the plan were worked out to the satisfaction of all concerned, and the separation took place in the spring of 1908. On March 20 of that year articles of incorporation under the laws of Wisconsin were filed by James H. Stout, Lorenzo D. Harvey, and William C. Ribenack. The name of the corporation was The Stout Institute, and this was also the designation of what was formerly known as The Stout Training Schools. The new organization was a nonprofit corporation, without capital stock, and its aims were to be educational exclusively. The members of the corporation were never to exceed 15 in number, and the charter included a plan by which members of the board of trustees were to be elected by ballot from among the members of the corporation.

Dr. Harvey was named the first president of The Stout Institute. The board of trustees of the corporation consisted of: president, James H. Stout; vice-president, Lorenzo D. Harvey; secretary, W. C. Ribenack, Mr. Stout's private secretary for many years; W. H. Hatton of New London, Wis.; and George R. Peck of Chicago.

At that time four distinct lines of work were carried on by The Stout Institute: (1) the preparation of teachers of manual training and of domestic science and art; (2) the training of young women as homemakers; (3) the training of young men as workers in various mechanical trades; and (4) experimental work in the field of industrial education.

Charter Provisions

In accordance with the provisions of the charter, the new corporation was empowered to conduct, promote, and maintain the educational enterprises outlined as follows:

1. To provide facilities in the way of buildings, equipment, and teachers through which young people of both sexes may secure such instruction and training in industrial and related activities as will enable them to become economically and socially effective.

2. To provide the technical and professional training of secondary and collegiate grade essential for the preparation of teachers of industrial and related subjects in public and private schools, and teachers and supervisors of kindergarten and primary work.

3. To provide for the inauguration and conduct of investigations and experiments for the purpose of determining the educational, social, and economic values of industrial education, and the scope, character, and place of such education in the public school system of the country.

It should be explained that, although The Stout Institute was no longer a part of the city school system, the closest possible cooperation continued — and continues to the present time. Following the separation, the manual training and domestic science classes in the city schools continued to be taught by student teachers from the senior classes of The Stout Institute, under expert supervision and direction.

A Tragic Interruption

As previously stated, the manual arts building and the trade school building were erected on land which belonged to the city of Menomonie. Soon after The Stout Institute was incorporated, and the urgent need of another building became apparent, the question arose as to the propriety of a private corporation erecting one or more additional buildings on publicly owned land. After full discussion it was decided that the best solution would be for the city to deed to the corporation, or to Senator Stout, the land on which the existing buildings stood, and for the corporation to acquire the land deemed necessary for future expansion.

The Commercial Club of Menomonie took the initiative, and submitted to the city council a petition requesting the transfer of the real estate in question, and the necessary papers were executed during the summer of 1910. President Harvey and Senator Stout immediately began work on plans for the proposed new building.

Negotiations were begun also looking to the purchase of another tract of land directly across the street from the existing plant. At about this time also Senator Stout was discussing with Dr. Harvey the details of a plan which he had been considering for some time for the establishing of a suitable endowment for the permanent support of The Stout Institute.

All these plans were brought to a sudden termination by the death of Senator Stout, on December 8, 1910, after an illness of four months. It may be noted that although Mr. Stout was a man of considerable means, and actively engaged in a variety of manufacturing and business interests, he died without leaving a will. At the time of his death he was president of the First National Bank of Menomonie, of the Wisconsin Milling Company, of the Stout Lumber Company, and of the Thornton and Wilder Railroad of Arkansas. He was also one of the principal stockholders and an officer of the Bank of Menomonie.

(To be continued)

Consumer Education in Industrial-Arts Architectural Drawing

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One of the nation's leading newspapers recently bore an article with a headline that read "Ex-G.I.'s Here Borrow $1,000,000 a Week for Home Buying." This had reference only to the city of Washington, D. C. Similar situations are found in other cities, towns, and communities throughout the United States. Such an impetus of buying and dealing in homes represents a strange and new adventure for thousands of young Americans. Many of them are experiencing the problem of evaluating materials, property, construction details, etc., for the first time in their lives.

The modern construction industry has advanced greatly. New materials, new construction units, and new construction practices have found a place in the modern home. Many of the traditional practices have given way to the more expedient and, in some cases, not too desirable forms of construction.

Just how long this era of skyrocketing housebuilding will last is not certain. But it has become more and more evident that the buyer of homes today must have a broader concept of construction, materials, and values than ever before. This has been obviated by the many recent developments in the domestic housebuilding industry. The boom of today may have reached its high point and started to decline by the time the present generation in junior and senior high school is ready to assume the role of buyers or builders of homes. Nevertheless, it goes without saying that they too will be faced with the problem of making a home, many of them planning a new home, or purchasing an old one. At any rate, they are currently close up to the matter of housing.

Now is the time when the proper learning experiences in consumer education will add much to the ability to make right

An exhibit of building materials used in house construction. This exhibit is used in conjunction with architectural drawing classes conducted in the industrial-education classes at the University of Maryland

judgments for these boys and girls who are the future homemakers of America.

The architectural drawing class in high school provides a most unusual opportunity for teaching many of the aspects of consumer knowledge with regards to the home.

Adult Evening Classes

It is not only important that the buyers of a few years hence be properly oriented along such lines, but the buying generation of today can take advantage of these same experiences through the adult education classes offered in many communities.

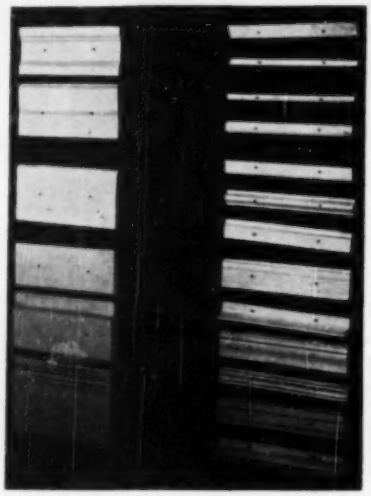
To the adult who is anticipating the erection or buying of a home, the industrial-arts architectural drawing course would be of inestimable value. In a community where there is a considerable number of prospective home planners, or buyers, the educational system has a debt to such a populace to see that they are properly instructed with relation to their needs, and if there was ever a time when consumer education with respect to the home builder or buyer was a need, it is at the present.

The teaching of such courses in architectural drawing will of course vary in accordance with the groups to be taught. But, regardless of the group, if it is to be a course in the true spirit of industrial arts, it will require the ingenuity and alertness of the teacher or teachers concerned. It is needless to say that merely drawing a definite number of plates will not provide the needed instruction or experience. The mechanics of drawing is important, but it is only one of the factors in achieving the goal or objective of better consumer education.

Such a need as is presented now requires a teacher who is aware of the real problem, and who is alert to the changing world of which he is a part. Building practices have changed, and therefore, these changes must be reflected in his teaching. The variety of building materials has greatly increased in number, and this likewise must be reflected in his teaching. Every effort should be made to make the course as up to date and as functional as possible.

One of the phases of instruction should deal with those factors to be scrutinized when purchasing a new house. Such a unit may be divided into the main areas of the house, e.g., the basement, first floor, second floor, attic, and the roof, and the discussion devoted to the points to be observed in buying a home with respect to each of the subdivisions mentioned.

The following is a listing of some points that could be stressed in dealing with the factors incident to the basement and foundation.



A photograph of a 6 by 9-ft. display board on which is mounted a wide variety of moldings, trims, floorings, and millwork commonly used in house construction. This panel is used in architectural drawing classes in the industrial-education classes at the University of Maryland

1. Determine if possible the nature of the ground upon which the house is to be built, e.g., stone, fill, natural soil, etc.
2. Is the basement adequate in size?
3. Will the basement structure permit change if desired?
4. Is the basement properly lighted?
5. Is the basement well ventilated?
6. What provisions are made for exits or entrances?
7. What is the condition of pillars, columns, or similar supports?
8. Is there any evidence of strain and distortion in the supporting units?
9. Is there evidence of termites in the first-floor joists and sill?
10. Are the first-floor joists and sill securely anchored to the foundation?
11. Are the sill and floor joists sufficiently high above the ground level to prevent water entrance or water rot?
12. Is there evidence of long unsupported runs of floor joists?
13. Are the floor joists of sufficient size to withstand the proposed weight load?
14. Is there added support given in areas that must hold the heavier household units?
15. Has the builder used good construction practices in joining headers, trimmers, etc.?
16. Does the work show evidence of skimping of materials?
17. Are there cracks in the walls?
18. Does the floor or walls show evidence of water seepage?
19. Is there a usable and practical drain in the basement?
20. What is the general condition of the floor?

These are a few of the many items that the prospective buyer should have an understanding of in order to make a good decision in buying a house. Similar listings can be made for other parts of the house.

Many young Americans will be forced by circumstances to purchase a house that will not be exactly in line with their needs or desires. As a result, a very valuable part of the time can be spent in working over old plans and exteriors of houses to determine what additions or improvements can be made to make these old structures more livable and suitable for one's needs. This particular part of the work can be conducted in either a group discussion and planning method, or by means of individual problems with every attempt being made to have the learner select his own problem.

Building materials can be analyzed with respect to their cost, desirability, strength, and usage.

The interpretation of building blueprints should be an integral part of the course of study. The drawings in the course should in all respects reflect the objectives of the course, and not be a matter of busywork and a time-consuming element.

The reference bookcase in the classroom should contain in addition to the architectural drawing texts, some of the leading periodicals in the field of domestic architecture, and as many up-to-date building material catalogs as possible.

Movies, slides, or strip films depicting various phases of construction should be presented wherever possible, in order that the learner may receive as wide and varied an experience as possible.

Field trips to new developments are of great value, providing the trip can be properly timed in regard to both the student and the builder.

Speakers brought into the classroom from the construction industries and architectural firms may provide much of interest and instruction in the course.

A significant exhibit of building materials can be built up in the classroom by collecting samples of various types of materials and mounting them on a panel, or other similar display device. The students can assist in this work also and further increase the teaching material available in the classroom.

The members of the class should be encouraged to bring into class such things as newspaper clippings or magazine articles pertinent to the work being done.

Related Training For Veterans In On-Job Training Programs

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The establishment of the on-job training program for all veterans (disabled and nondisabled) who are eligible for benefits available under the various laws passed by Congress has led to a heavily increased demand for instruction that will supplement the working experiences and will be directly related to what is being learned on the job. Previous to August, 1946, there was no specific legislation in existence governing the operation of on-job training programs for nondisabled veterans (those eligible for benefits under the provisions of Public Law 346, 78th Congress). Out of this situation there developed a realization of the need (1) for a set of standards for on-job training, and (2) for a clearer outline of the responsibilities of each of the agencies concerned with this problem. Therefore, in August, 1946, Congress passed Public Law 679, which set up certain specific standards for the operation and supervision of on-job training programs in which nondisabled veterans are employed, and also definitely indicated the relationships between state and federal representatives in the operation of this program. One of the standards established by this law is that which requires that provision be made for related training or supplemental instruction for the individual veteran who may need it. Public Law 679 also places the responsibility for determining whether or not related training is necessary and adequate in the hands of a State Approving Agency. The responsibility of the Veterans Administration is (1) to determine whether or not related instruction is provided (when it is indicated that the individual veteran may need it), (2) to check on the progress the veteran is making, and (3) to report to the appropriate state agency when the related training is not in line with the requirements of the on-job training program.

Since there are many organizations and individuals involved in this program who have had little or nothing to do with training in the past, there is likely to be either misunderstanding or lack of understanding of the terms used and of the different elements that make up a total program. The following paragraphs, therefore, have been prepared for the purpose of providing a simple explanation of related training or supplemental instruction, and of the policy of the Veterans Administration relative to this matter.

Learning an occupation requires two types of activity. One of these consists of learning of actual operations, processes, and techniques while working at the job, and the other comprises a body of subject matter which cannot readily be taught on the job but which is important because it is an aid to the learner in understanding better the fundamentals of the entire occupation and which serves to make him an all-round workman. The second phase mentioned in the foregoing is known as related training or supplemental instruction, and it may be defined as that kind of training which has specific application to a job but which is broader in scope than the actual job instruction since it includes, among other things, the study and understanding of the principles and the scientific or theoretical foundations upon which the operations are based. Related training should always be given through organized instruction in some place away from the actual working situation.

Types of Related Training

There are three kinds of related training or supplemental instruction which might be made a part of on-the-job training:

a) One kind consists of information which a worker needs in order to form judgment in doing the work. This is called *technical information*, and it may include knowledge of mathematics related to the trade, scientific principles, specific manipulative operations which cannot readily be learned on the job, technical terms, safety, and the like. The nature of the subjects will depend on the nature of the occupation which the trainee is learning and, to some extent, upon the scope of the operations which can be taught on the job.

b) The second includes information that is desirable and good for the worker to know, but it is not always necessary in order that he may be proficient in his work. This type of related training is called *general information*, and it may include such subjects as history of the trade or occupation, relationship to other occupations, economic and social value in the community, sources of raw materials, methods of manufacture or production of materials, and others which tie it in a general way to the occupation.

c) The third comprises information that has value mainly from the standpoint of providing the trainee with an understanding of the opportunities for employment or promotion, an understanding of employer-employee relationships, ethics of the occupation and information about available training facilities. These subjects can be grouped together under the term *guidance information*.

The Veterans Administration is primarily concerned with the first of the three types of training listed, since it has the responsibility of seeing to it that the veteran is either rehabilitated, if he is disabled, or that he becomes employable or readjusted, if he is training under the provisions of Public Law 346. The Veterans Administration is not disposed to discourage a trainee from securing the general information which would be helpful to him, but because of the limitations of time it desires the veteran to secure the kind of related training which is of immediate practical value (technical information). As a rule, the third type of related training, which has purely guidance value, cannot be encouraged by the Veterans Administration because it is assumed that the average veteran is mature enough to understand the implications of the selection of a proper job objective. Every veteran has the privilege of utilizing the services of the advisement and guidance section of the Veterans Administration, and he should be urged to make use of these before he enters upon a job training program.

The Veterans Administration, therefore, has two aims in view in this matter. One is to encourage the establishment of facilities that will provide related training of the technical information kind, and the other is to make sure that every veteran who is in an on-job training program is

scheduled for related instruction and actually attends the classes or participates in the programs that are now available or that will be organized in the future.

Where Related Training May Be Obtained

The question then arises as to where related training may be obtained. It should be remembered, that emphasis was placed on the principle that related training should be provided through organized instruction away from the job because it has proved to be the most satisfactory method of operation. It does not necessarily mean, however, that this kind of training must be given in an educational institution or in a formal classroom atmosphere. Related training may thus be made available in a variety of situations, as is indicated in the following:

a) In a vocational school or in a high school, where the instruction may be either in a classroom, a shop, or a laboratory.

b) In a technical institute, conducted by either public authorities or by private organizations.

c) In a college or university, either on a part-time or a full-time basis.

d) Through correspondence study, provided that the subject matter is directly related to the occupation which is being learned and that arrangements are made for conducting the correspondence study either by someone in the training establishment who is well qualified to do this job or by a local educational institution which has on its staff instructors who possess the necessary background to qualify them to direct the study. Correspondence study may be the only satisfactory means by which some veterans in certain localities can receive the necessary related training. However, it is well known that individual study without adequate supervision or encouragement very frequently is not carried to completion. It is, therefore, sound policy to arrange for direct instruction wherever possible, but when it cannot be so arranged steps should be taken to provide for some form of control of the instruction of the individual trainees along the lines outlined. A veteran may, therefore, carry on a correspondence course through home study, but he should be encouraged to report periodically to a training officer and an educational institution, if possible, on the progress he makes in completing the lessons.

e) In the training establishment (place of employment), whenever there is no possibility of the related training being offered by a recognized and approved training institution, provided that the following conditions prevail:

1. The related training is given at times when the trainee is not regularly employed at the job objective.
2. The periods when related training is given are regularly scheduled and a record of attendance is kept.
3. The instructor is qualified by experience and background to conduct the course.
4. The instructional material is well organized and is directly related to the occupation being learned.

In the foregoing, a rather general description of the term "technical information" was given. The following is a more specific explanation and illustration of the meaning of this term. It was pointed out previously that *technical information* will vary with the occupation being learned, but in all cases it has specific reference to the job operations or the processes or techniques which are included in the activities of the occupation. Thus, in some cases, the related training might consist of certain kinds of manipulative operations when the trainee has no opportunity to experience them while he is learning on the job. For example, a veteran who is being trained as a mechanical draftsman should know something about machine-shop practice, pattern-making, simple metallurgy, and possibly foundry operations. Usually he does not have such experience on the job and the related training in a vocational school or a technical school might consist, to a large extent, of practice in the job operations just mentioned. On the other hand, a machinist trainee may need as part of his related training, instruction in blueprint reading, shop sketching, mathematics, elementary metallurgy, and probably applications of the principles of physics. These are subjects which cannot readily be learned on the job but which are needed if the trainee is to become a well-qualified mechanic. Similarly, a printer (compositor) trainee might take as his related training, courses in art and design, classification of type faces, rules of measurement, as well as instruction in English composition, in grammar, and in spelling. To illustrate further, the following are examples of related training of a *technical information* nature:

General Selling	*Accounting*
Public speaking	Business law
Customer buying motives	Economics
Laws and regulations dealing with contracts and sale of the specific product	Tax laws and regulations
Specific product information	Cost methods
Manufacturing operations	Auditing procedures

The point to be remembered is that related training is the kind of training which enables the learner to round out his experiences and to become, at the conclusion of the training period, an all-round worker in the occupation, to the end that he may be employable in any establishment in which workers of that occupation are employed.

Prior to the passage of Public Law 679, the responsibility of the Veterans Administration toward the training of nondisabled veterans consisted mainly in determining eligibility, paying subsistence allowances and instructional costs, and supplying tools, equipment, and books. Now, this agency is more definitely concerned with the progress of this group of veterans while they are in training and each training officer, therefore, is required to supervise periodically a rather large group of trainees. Supervision of on-job trainees, in so far as related training is concerned, may make it necessary for each training officer to do one or more of the following:

a) Determine whether related training has been specified by the state approving agency and whether it has been arranged for and made available.

b) Determine whether the trainee is actually participating in a program of related training.

c) Determine whether the related training fulfills the needs of the program, the trainee, and the training establishment from the standpoint of the kind, quality, and pertinence of the material presented.

d) Determine whether the trainee is making satisfactory progress.

e) Assist training establishments, whenever necessary, to set up the content of related training for the trainees, and to inform them of the facilities that are available for such training.

A basic concept underlying the operation of the program of on-job training for nondisabled veterans is that there is a direct relationship between the veteran and the Veterans Administration on the one hand, while on the other hand there is a direct relationship between the training establishment (place of employment) and the state approving agency. The federal agency, therefore, supervises the individual veteran, while the state agency supervises the training establishment. This principle applies to related instruction, as well as to every other phase of on-job training. Thus, when a trainee makes unsatisfactory progress in related training or refuses to take it, action can be taken by the Veterans Administration to interrupt the training with the result that the veteran ceases to draw subsistence allowance and is not

eligible to receive the necessary tools, equipment, supplies, and books. If the training establishment fails to make arrangements for related training, or refuses to make related training an integral part of the entire program, the state approving agency may withdraw approval previously granted. Withdrawal of approval to operate as a training establishment has the effect of interrupting the programs of those veterans currently in training, and of preventing the employment in the future of veterans who may desire to be trained in that particular plant, store, or organization. Interruption of a training program or withdrawal of approval of an establishment may be very serious in its effects upon the veteran. Therefore, action of this kind should be taken only as a last resort when it becomes evident that the veteran is not benefitting from the training.

Since this program is definitely dependent upon the co-operation of all concerned, Veterans Administration, state agencies, local representatives of schools, training establishments, and veterans it is necessary that everyone who has a stake in it put forth his best efforts to make it successful. School administrators, co-ordinators, and instructors are in a strategic position to bring about the success or failure of this program because they have many contacts in their communities and because they are best qualified by training and experience to give the actual supplemental instruction. The responsibility of the school people in this connection is a great one, but the record of past achievement indicates it will be fully met.

Hobby Crafts for the U. S. Navy

W. T. BAXTER
Bethesda, Md.

Believing that the bluejacket is always happier when engaged in some creative work of his own planning during his off-duty hours, the United States navy has successfully launched a most comprehensive hobby craft program.

Hobby craft shops are being installed at naval stations, active and reserve, and aboard ships as fast as equipment, tools, and supplies can be acquired.

A total of 37 crafts have been selected and analyzed, even to the minutest detail in regard to space required, equipment, tools, and supplies needed, as well as the various projects which may be made in each craft field.

Early in 1945 Secretary of Navy James Forrestal authorized the Bureau of Naval Personnel to start hobby craft shops along with other co-operative projects, in order that more attention be given to craft activities, hobbies, and games.

The first hobby craft shop was opened at Alameda, Calif., Naval Air Station on September 1, 1945. It immediately won the favor of all personnel — officers as well as enlisted men — and is still operating with a large daily attendance. Officers as well as enlisted men are permitted to bring members of their families into the hobby craft shops, so that they, too, may work.

The navy expects the following results from the program:

1. Improved morale
2. Decrease in disciplinary cases
3. Increase in devices for production timesaving
4. Better personnel relationships between enlisted men themselves, and between officers and men

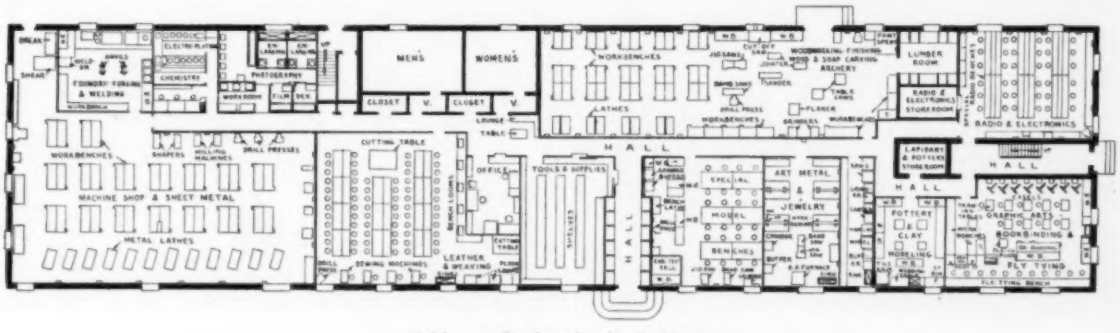
"Along with most modern thinkers in the field of personnel management, the navy believes that the individual must be busy before he can be happy. If possible, he should busy himself at something which greatly interests him," writes Admiral Louis E. Denfeld, commander-in-chief of the Pacific Fleet, a former chief of Naval Personnel, in *Handbook for Construction and Operation of U. S. Navy Hobby Shops*.

"Leisure time activities, such as the navy's hobby craft program," he says, "helps to fulfill that need. Among the 37 available crafts everyone can find some hobby for his off-time hours — encouraging him to develop skill in a particular field and giving him pleasure in the accomplishment.

"Every sailor whose interest is snared by hobby crafts should be one less problem for the navy."

Rear Admiral Thomas L. Sprague, USN, chief of Naval Personnel, says: "Hobbies, particularly the hobbies that foster creative instinct, provide a thoroughly satisfactory answer to the ancient percept, 'An idle man's brain is the devil's workshop.' The navy expects a decrease in disciplinary cases with the establishment of its hobby craft program.

"Facilities for the pursuit of hobby crafts in leisure moments should have other salutary effects — improved morale, better relations among a ship's company, and even the development of new devices. The



Hobby crafts for the U. S. Navy

navy hopes that results of the hobby craft program will be measured, not by the monetary gain, but by happy ships."

Captain Ralph E. Wilson, USN, former Director of Welfare, Bureau of Naval Personnel, says:

"I consider the hobby shop program as now sponsored by the Welfare Activity, Bureau of Naval Personnel, to be one of the outstanding developments along the lines of recreation of recent years.

"While the basic conceptions of hobby shops or arts and crafts, as a leisure time occupation has long been recognized as of high recreational value, never before has a program embracing, as this one does, the features of equipment and material supply, financial assistance, and complete instructions for establishment and operation with skilled professional guidance at the top been available to the navy.

"Experience already has shown that on ships and stations where the hobby shop program has been given vigorous and active support an over-all active participation in the shops of over 50 per cent of the officers and men attached has become a reality. No other recreational endeavor, with probably the one exception of motion pictures and theatrical entertainment, can even hope to reach such a percentage in its appeal.

"Added to the general improvement of morale resulting from leisure time occupation in the fascinating and uninhibited pursuit of hobbies which this program provides is also the inherent feature of basic training in the use of tools and the development of skills which is essential to success of the personnel of the modern navy.

"These factors, it appears to me, make the hobby craft program one which deserves the utmost support of every commanding officer who fully realizes all the implications of his basic responsibility for the general welfare of the men he is privileged to command.

"It has been a privilege to have had a hand in the initial development of this navy program and to watch it grow under the full sponsorship of the Bureau of Personnel and the skilled guidance of Captain Cox. By means of this book, I sincerely hope it will be further promoted to universal navy use on every ship and station."

"The potential value of hobbies in a recreational program has long been recognized by professional workers in the morale and welfare field," says Captain G. A. Leahey, Jr., USN, Director of Welfare, Bureau of Personnel, Navy Department, in a memo included in the instruction handbook.

"Every naval officer on board ship has at some time or other observed the indications without perhaps recognizing the latent possibilities.

"The bluejacket is always happy when engaged in some creative work of his own initiative. In spare time his talent is often bent toward the production of canvas or white line fancy work, belts, buckles, rings, ashtrays, mats, table lamps, models, and what not.

"At that stage in the late war when the navy recovered from the first assault, and organization and funds could be devoted toward planned comprehensive efforts to assist the commanding officers in maintaining and bolstering morale, 'arts and crafts' programs, somewhat similar to what is now called hobby shops formed an important part of the effort. 'Arts and crafts' kits were included in the advanced base components during the last stages of the war, in order to give the men on the beach a few tools and some material to use in off-duty hours.

"The hobby craft program, being part of the recreational program for the personnel of the navy, is a governmental function, administered by the chief of the Naval Personnel.

"Consequently, when the Surplus Property Disposal Laws went into effect upon demobilization, there was offered an opportunity to acquire equipment, tools, and materials from surplus which made possible a timely expansion of hobby craft activities during the critical period of demobilization. To provide the program for any ship or station where it was wanted and to encourage its establishment, the necessary funds were budgeted from the nonappropriated Bureau of Personnel Central Recreation Fund. Half the standard installation cost was allocated to any command taking up the hobby craft program.

"A central organization was established to produce instructions, plans, posters, etc., and to assist in installation and procurement. Further, most valuable assistance has been obtained from the office of Naval Research.

"The results have been outstanding in some commands, and wherever the hobby shop has been established it has been an infallible source of interest and contentment, therefore an aid to morale in the activity concerned.

"This book is published as a guide to assist commanding officers and recreation officers in furthering the leisure time interests in hobbies of all naval personnel, active duty and reserve."

A special section, called the hobby craft section, was set up under Welfare Activity,

Working with leather is always interesting

Working in the ceramics section

Bureau of Naval Personnel, at Washington, in order to get the vast craft program underway. This section is under Captain Charles W. Cox, USNR, who has had years of experience in vocational education and industrial arts in public schools and colleges.

Captain Cox, who from 1932 to 1937, was director of industrial arts and vocational education in the public schools at Alameda, Calif., entered the Naval Reserves as a lieutenant commander. He was sent to the Navy Department, Bureau of Personnel, in January, 1946, to get the craft program started. Captain Cox had associated with him Commander George M. Beckworth, USNR, and Lt. Commander S. A. Cravotta, USNR, both of whom now are back in civilian life.

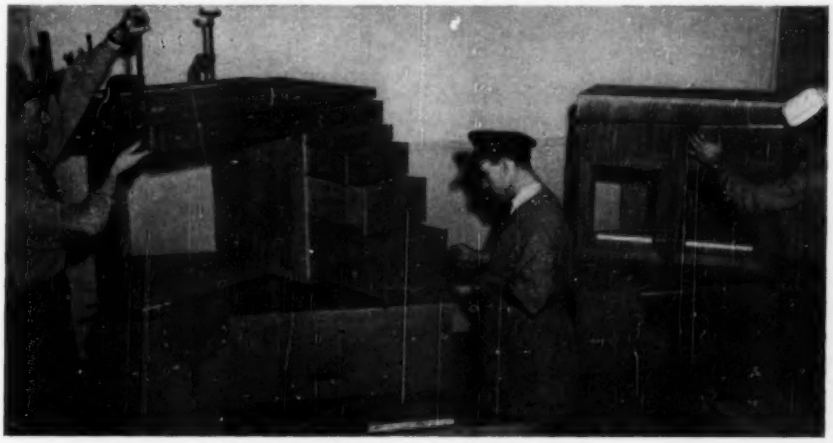
Before coming to Washington Captain Cox was stationed at the Naval Air Station, Alameda, Calif., where he had much to do with the vocational education program and industrial relations. At one time during the war there were more than a thousand naval trainees at the Alameda station, there being five assembly and production shops.

Captain Cox, writing in the *Handbook*, says: "Material listed in this book is the accumulation of facts gathered from a tireless study of the subject of hobbies and their influence on the lives of humans.

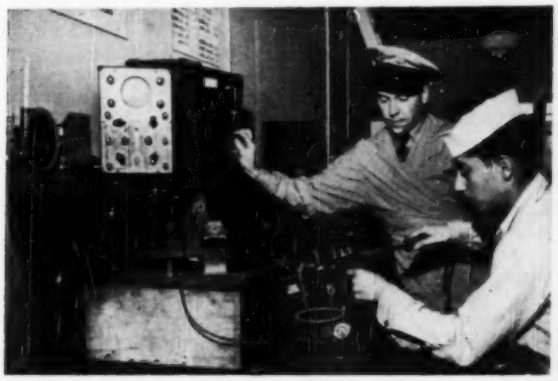
"Under proper management, this program will contribute its vital share to the over-all picture of morale-building as applied to recreation."

The 37 crafts which are included in the hobby craft program are [crafts marked with an asterisk (*) are recommended for shipboard use]:

1. Archery
2. Auto repair
3. Bookbinding*
4. Cabinet shop
5. Carving* (wood, soap, and plastic)
6. Ceramics* — pottery
7. Chemistry
8. Clay modeling*
9. Electroplating
10. Etching and engraving*
11. Fly tying*
12. Forging and ornamental iron
13. Foundry
14. Gardening
15. Glass blowing
16. Graphic arts*
17. Lapidary* (cutting and polishing of stones)
18. Leather*
19. Linoleum block printing*
20. Machine shop*
21. Metalsmith, art metal, and jewelry*
22. Model airplanes*
23. Model automobiles
24. Model ships and boats*
25. Model railroads
26. Photography*
27. Plastics*



Cabinet work appeals to many



Building radio receivers and model planes powered by gas engines

28. Printing* (hand press)
29. Radio*
30. Rubber stamp making*
31. Sheet metal
32. Shell craft*
33. Silk screen printing*
34. Weaving, knotting, and braiding*
35. Welding (acetylene and electric)
36. Wood finishing*
37. Wood turning

"These 37 crafts offered to navy personnel under the hobby program afford wide possibilities for workers desiring to develop skills potentially useful in varied fields," says Captain Cox.

"These diversified crafts encourage the development of skills and the application of imagination. While developing these specialized skills, he is actively contributing both to a possible future and to a healthy satisfaction in personal achievement at the moment."

The construction layout for any hobby shop is based upon predetermined figures on personnel and space available. Eight different size shop plans have been worked out in detail by the hobby craft section. Each plan is drawn and designed to suit a given size or classification of naval shore establishment activity. Each shop plan contains all machine tools needed for that particular size of installation.

Instructional posters, 17 inches by 22 inches, were prepared by the hobby craft section. These posters are divided into four classes:

1. Advertising posters which call attention to the hobby craft shop and the various crafts offered in the shop.

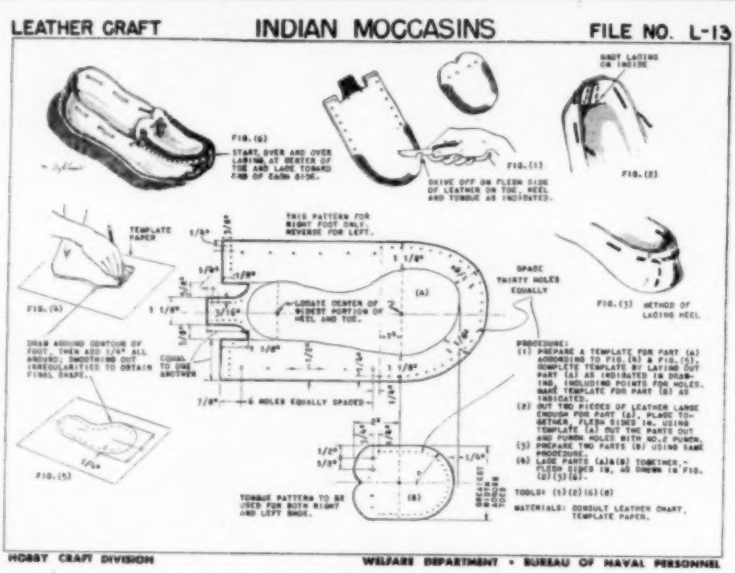
2. General information posters which direct interested personnel in procedures to follow in order to comply with the general rules of the shop. These posters provide information on (*a*) how to get acquainted with the shop, (*b*) how materials, tools, and instructions are acquired, and (*c*) shop rules.

3. Instructional posters, which for a specific crafts replace an instructor by showing the worker step-by-step general procedures peculiar to a specific craft. For example, instructions for tooling, carving, dyeing, and lacing leather. Such posters also may explain photography in a similar fashion, or they may indicate the procedures for cutting, grinding, and polishing semiprecious gem stones.

4. Machine tool operation posters present step-by-step procedures for operating individual machine tools. These posters are designed to fully illustrate all working parts of each machine tool and guide the workers in their operation with special emphasis on safety precautions.

A total of 830 loose job sheets have been worked out in detail covering a wide variety of items and projects in all 37 crafts. Each job sheet represents an article of current popularity. Complete instructions for the construction of each article are incorporated on the job sheet in step-by-step fashion, so that a minimum amount of coaching or individual instruction is required.

The worker when first entering the hobby shop decides what he wants to make, demonstrates to the shop instructor, or an assistant, that he is capable of operating a machine, or is given adequate instruction on its use, if he has never operated the machine. The worker is then given an identification card certifying that he can operate the equipment necessary to make the project. The worker then purchases the necessary materials with which to make his project, checks out the necessary tools and job sheet and begins work.



There are no strict attendance rules. Persons are allowed to go to the hobby shops at any off-duty time that the shop is open for business and not overcrowded.

"This hobby training," says Captain Cox, "encourages an over-all mechanical aptitude. Workers — stimulated by the possibilities of crafts they previously knew little about — will demonstrate a desirable versatility in the performance of their future navy duties.

"The personal satisfaction felt by workers in successfully solving the challenges of a new craft will go far toward developing desired confidence and resourcefulness. The navy's hobby program is presented in the belief that a worker utilizing tools available for craft will participate in the recreation project to the extent that he will benefit himself, his shipmates, and the navy."

"Five years from now the navy hobby craft program will have its effect upon many of the people of the United States," predicts Captain Cox, who points out that by that time many of the navy personnel will be back in civilian life pursuing one or more hobby crafts they learned while in the navy.

Hobby crafts would do much to curtail juvenile delinquency if such a program were introduced and properly administered in our cities and counties, is the belief of Captain Cox. He points out, however, that such a program would not be feasible unless it was comprehensive and offered a large number of crafts. "We have not been doing enough to interest our young people in worth-while hobby crafts. Money expended for such purposes would keep many of our youth profitably occupied during their leisure time."

Captain Cox speaks enthusiastically about craft work in our schools. "Interest a person in a hobby and use it as a motivating purpose. All hobbies tie in with most subjects in one or more ways," he says.

Checking the Student's Knowledge With the Camera

THURSTON M. ROTHROCK
St. Charles, Mo.

The knowledge the student has gained may be very easily checked at different stages of the machine-shop course by a series of carefully planned photographs. These photographs should be taken of various machine tools, machine operations, hand tools, precision tools, etc. In fact, anything that pertains to the course may be photographed and used in these tests.

As illustrated by Figures 1 to 14, a test of a photographic nature may be presented in a very interesting manner. Most students do not relish the thought of a written examination of any type, but a handful of pictures always interests them at once. There is hardly anyone, young or old, who doesn't like to look at pictures.

In a class of machine-shop students it is very hard for the instructor to cover each hand tool, each machine, each operation without missing some of the students, especially since the rate of student progression varies as the course advances. As a result, the teacher soon finds himself teaching a good deal on an individual basis. How then, is he going to be sure of eventually giving each student the same information? One way to check is through a series of pictures covering the basic parts of the course. Through these he can check each student's knowledge and his own teaching efficiency.

It is very hard to find a textbook that will work with the tools that are a part of the machine-shop setup in each school. Machines will vary as to types and sizes. Shops will vary as to machines and the types of operations that may be performed on each machine. Therefore, a textbook written to cover the tools in one shop will not work satisfactorily in another shop. Such a text will only confuse students who work in a shop that does not contain the tools described and illustrated in the textbook.

That is where it is advantageous to take a series of pictures of the machine tools in the school's own shop and use them for instructional material. When jobs are photographed on the school's own machinery then the student knows definitely that that particular job may be done with the tools at hand. But if an illustration of a larger or a more complicated machine is used to explain the same type of job, the student gets the idea that the work can only be done on the larger machine.

It is also hard for the instructor to remember whether or not he has fully described each hand tool that is carried in his school shop. Too often he will find that he has not demonstrated the use or even given the name of some simple tool. Therefore, a photograph taken of all the hand tools in the school tool crib is in order. The picture may be enlarged to an 8 by 10 photograph, or it may be photostatically blown up to an even larger size, and then each tool in the picture should be given a number. Several of these pictures are then displayed at a class session and the students are required to identify each tool as to its name and use. When the results of this test are compiled the instructor will know what tools need further demonstration and explanation. Here is where he will find out which tools he neglected to explain to his classes. A pic-

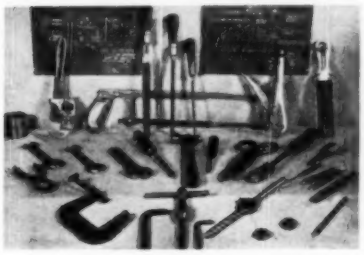


Fig. 1

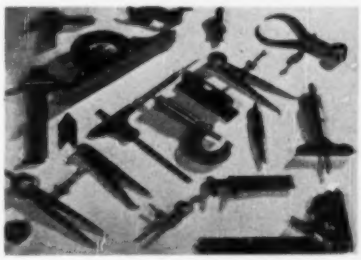


Fig. 2

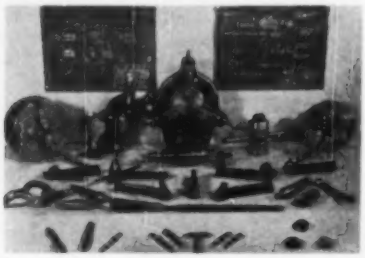


Fig. 3

ture of the type described is shown in Figure 1.

Another study of tools is shown in Figure 2, which shows the basic tools of the machinist, the names and uses of which should be fully understood by each machine-shop student. The tools are numbered on the print and copies of the print are passed out to the students who list the proper names and uses of the tools illus-

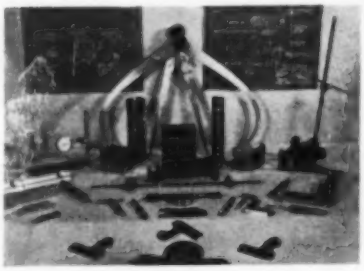


Fig. 4

trated. Here again is shown the value of pictures taken in the school's own shop as compared with tools illustrated in a textbook. The tools kept in the school's tool crib are the tools the student will use. Outside of possibly a passing interest in tools not contained in the school's shop, the student is primarily concerned with the tools at hand and these are the ones he should learn to use.

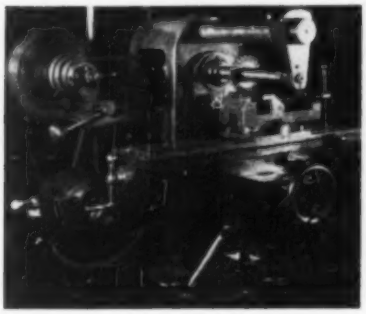


Fig. 5

Still another form of this type of picture test is shown in Figure 3, which shows all the important accessories for engine lathe operation. Figure 4 shows the more advanced tools used in the machinist's trade.

The illustrations used thus far have been of hand tools, machinist's precision hand tools, and accessories for engine lathe operation. Photographs of the actual machines contained in the shop is another

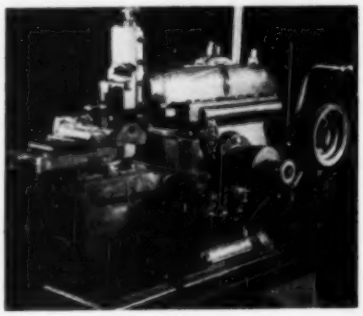


Fig. 6

type of picture that may be used in photographic tests.

Figure 5 is a milling machine, Figure 6 a shaper, Figure 7 a surface grinder, and Figure 8 a bench lathe. These illustrations all picture the machines in the school shop and an identification test shows whether the student knows the machines at which he works.

The picture test may be carried out further by making a series of photographs showing operations performed on the vari-

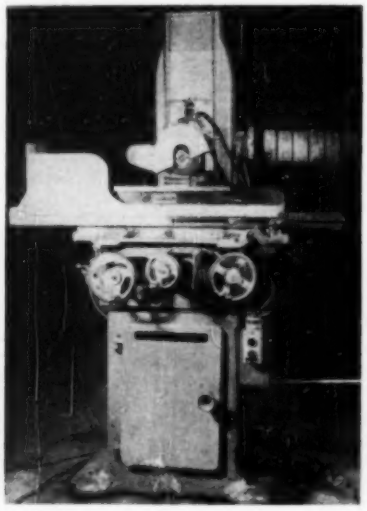


Fig. 7

Fig. 8

ous machines contained in the school shop.

In Figure 9, the operation illustrated is surface grinding. The student is tested on his knowledge of the operation being performed, the object (in this case a V block) that is being worked upon, and his knowledge of the machine nomenclature. He is expected to be able to name all parts of

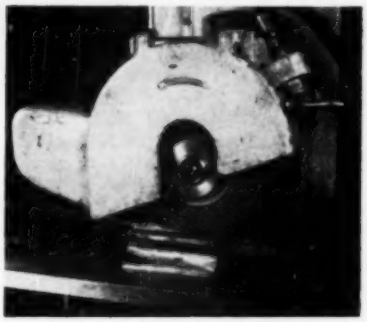


Fig. 9

the machine that show in the picture; such as, the magnetic chuck, the wheel guard, the spindle, etc.

Figure 10 is another of this type picture showing the operation of a metal band saw. Cutting a long screw thread on the engine lathe is shown in Figure 11. In this picture the use of the follower rest is clearly shown. The student is expected to name the operation and the parts of the machine that are shown in this picture.

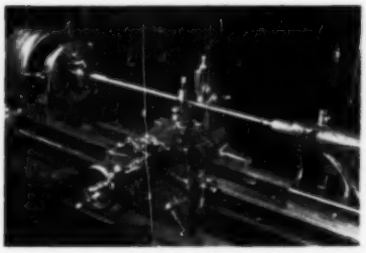


Fig. 11

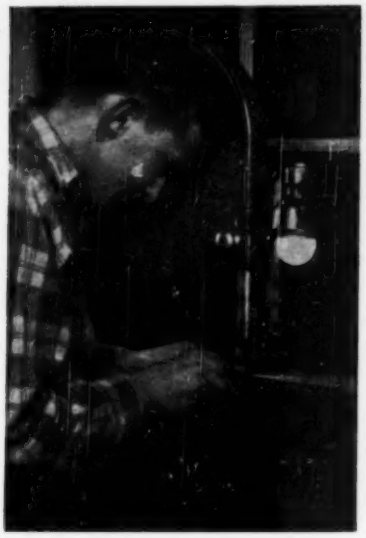


Fig. 10

Here again is where the instructor can check his own efficiency. It is frequently very easy during the course of a demonstration to overlook some small part of the operation or machine tool nomenclature. This will inevitably show up during the process of checking the student's answers to the photographic test.

Another phase and probably the most important part of photo test is its use in connection with *safety*. Figure 12 illustrates unsafe drill press operation. It shows an operator trying to drill a piece of steel held by the hand, instead of in a drill press vise. Also the operator is wearing a watch and a ring, other unsafe practices. In the safety picture test the student is checked as to safety knowledge. Again the instructor will usually find where he has failed to give complete safety rules, for in this picture the wearing of the ring and the watch was not noticed until after the picture was printed. The setup was originally made to illustrate the unsafe method of holding work on the drill press.

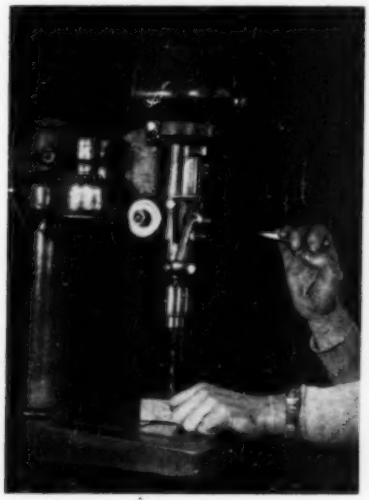


Fig. 12. An unsafe procedure

Using safety goggles when grinding on any type of grinding machine is one of the hardest things the instructor has to put across to the student in the safety campaign. The unsafe method of working at a bench grinder without wearing goggles, is shown in Figure 13.

A form of safety picture on the *what-is-wrong-in-this-picture* theme is shown in Figure 14. The setup purposely magnifies wrong procedure, but the wrongs illustrated occur in some form in every machine shop; that includes the industrial shop as well as the school shop.

The student should be able to list all of the wrong procedures, as well as all the unsafe conditions that are presented in the photograph. The apparent wrongs are the chuck key left in the lathe chuck, the ways of the lathe used as a bench (hammer, file, blueprint, C clamp, and center left lying on the ways of the machine), the hook stuck in the tailstock quill, the rag thrown carelessly on the tailstock and hanging where it will entangle in the lead screw, and chips allowed to pile up on the carriage.

Figures 1 to 14 show a few of the possibilities for pictorial tests that may be used in shopwork. The scope of material is unlimited and depends entirely upon the ingenuity of the photographer and the shop teacher.

As for the photographic work involved, the author took all of the illustrations shown. That doesn't mean, however, that machine-shop instructors without photographic aspirations cannot take advantage of the camera for class material. There are a number of ways pictures may be made inexpensively, if the school doesn't want to engage a professional photographer to take the photos. In almost any high school there are a number of camera fans. One of the camera fans may take the needed pictures. Some schools have camera clubs and the club could probably be induced to photograph the shop.

For the school that includes a photographic course in its regular schedule, the making of shop pictures will be easy. It will offer an excellent opportunity for on-the-job photographic training in commercial and industrial photography and will prove of benefit to both the photographic department and the shop department.

Fig. 13. If you value your eyes, wear goggles while grinding

The equipment needed to photograph machine-shop setups need not be too elaborate. A camera with a ground glass back should be used so that definite composition may be observed before the exposure is made. It is well to use Panchromatic film, as its speed under artificial light is greater and it gives a truer monochromatic reproduction than an ortho film. The negative size is not too important as a suitable enlargement can generally be made if care is taken in the processing of the exposed film. For negative sizes 2¼ by 3¼ and smaller a good fine grain developer should be used.

Sufficient lighting can be secured by using from three to four No. 2 photoflood

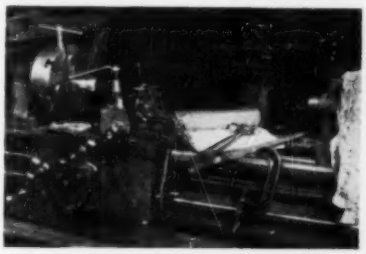


Fig. 14. What is wrong in this picture?

bulbs in suitable reflectors. The lights should be on adjustable stands for flexibility of light control. The developing and printing may be done in the school darkroom if one is available, or it can be done by a commercial photo finisher.

In this article the machine shop has been used as the department in which the photographic tests would be of value. That doesn't mean that such a system couldn't be used elsewhere. A photographic test could be used with equal value in almost any of the vocational subjects. There is no limit to the photographic possibilities; the limit being only on the instructor's ability to set up a shooting schedule to illustrate the units he wishes to put across to his classes.

English for Trade and Vocational Schools

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Appositives

(See preceding articles in January, September, and November, 1948, issues)

Because of their practical application in after-school life, appositives should be carefully taught to vocational school students. At the outset most of them will not even know the meaning of the word *appositive*. To secure mastery of appositives requires much practice and a fair degree of mental maturity, so the instruction should be spread out over a period of at least two years, tested and retested, and retaught as often as necessary.

In Murray Vocational School, work on appositives begins in the second year and is kept on a fairly simple level. In the junior year more difficult work is presented, and in the senior year mastery of appositives is required before a student completes his work for graduation.

There are two important uses of appositives: in filling out application blanks and in giving references in letters of application. Boys are interested in getting jobs; they will pay attention to instruction which they know will be useful to them later. Before starting to teach appositives, the instructor should tell his students that they will have to fill out application blanks and write letters of application, and that appositives will be used in both. This is a good time to discuss *references* — the reasons for giving good references and how to use them in application blanks and application letters.

As soon as students' interest is aroused, the instructor should ask for a definition of the word *appositive*. To most boys the word *appositive* is meaningless and requires the instructor's definition — that an appositive is a word or group of words which adds extra information about a person, place, or thing, that is, it tells more about the person, place, or thing. Place this definition on the blackboard and have the students copy it, together with examples into their notebooks for future reference.

The definition on the board should be followed immediately by an example of an appositive.

"Mr. John H. Clark, principal of Murray Vocational School, is an experienced draftsman."

Underlined appositives make more impression on students' memories; therefore it is a good practice always to underline them in explanatory work. The instructor should call attention to the underlined appositive and show how it illustrates the definition: "principal of Murray Vocational School" adds extra information (tells more) about "Mr. John H. Clark."

Next the student should be asked to call out several (3 to 5) sentences similar to the example already on the board. As these student-made examples are written on the board, the appositives in them should be underlined, and these should be copied by all students for their notebooks.

When the idea of "gives extra information" or "tells more about" has been stressed enough, the instructor should direct attention to the commas at the beginning and end of the appositive in each sentence by asking why these commas are used. This question will probably produce a guess or two without bringing out the real reason for the commas: they show that the appositive may be left out of the sentence without affecting the *sense* of the sentence. Without *principal of Murray Vocational School*, the sentence is grammatically complete: *Mr. John H. Clark is an experienced draftsman.* The instructor should discuss each sentence on the board in the same way until this idea has been understood and accepted.

Still another point needs to be explained: that the appositive *means the same* as the person, place, or thing about which it gives extra information. For instance, in the sentence used as an example, "Mr. John H. Clark" *is* "principal of Murray Vocational School." Each of the examples on the board should be discussed in the same way.

This is enough for one class presentation. As a matter of fact, it is more than the students can learn at one time. The instructor should suggest at the end of the explanation that the students review the material which they now have in their notebooks, in preparation for drill work at some future time.

Before the explanation can fade out of their minds from lack of use, the instructor should give a test on appositives the next day, using a set of sentences like these:

Appositives

1. mr w j cronan instructor in the woodshop teaches cabinetmaking
2. mr keith seyle assistant instructor in the electric shop is a graduate of murray vocational school
3. tom showed the oyster knife to mr burnett mr eye s assistant
4. mr theodore eye instructor in charge of the machine shop is also a capable draftsman
5. mr luther bergen our key club faculty adviser flew on combat missions over germany and japan during world war II
6. mr w c till instructor in the auto shop is an expert mechanic
7. joe explained his science job to mr voshell mr till s assistant
8. mr b t winter instructor in the electric shop was a chief warrant officer in the navy
9. the senior showed his blueprint to mr cordray instructor in charge of the drafting room
10. mr ralph sigwald a former murray student often sings for us in our assemblies

Tests consisting of similar sentences can easily be made, utilizing names of faculty members and prominent members of the local community. The names should be familiar to the students, in order to make this work easier for them and to keep them interested.

On the third day the errors made in the ten-sentence test should be discussed in class. Errors will be found most numerous in sentences 3, 7, and 9, in which the appositives come at the ends of the sentences — a phase of appositive work not explained in the first day's instruction. The instructor should now devote a few minutes to reviewing the definition, stressing again the reason for a comma or commas, and showing on the board both types of appositives (*inside the sentence*, with two commas, and *at the end of the sentence*, with only one comma).

At this point the instructor should again give an example of the use of appositives in application letters, writing on the board a sentence or two of this sort: "I have permission to refer you to Mr. John H. Clark, principal of Murray Vocational School, Charleston, 21, S. C., for statements as to my character, ability, and school record. If you wish further references, please communicate with Mr. Theodore Eye, head of the machine shop, and Mr. William J. Cronan, instructor in charge of the wood shop; they will be glad to give you details of my work in their shops." Any good book on business letters will furnish examples for as much additional study as the instructor considers necessary.

In the second year's work on appositives I use only two drill sheets, the ten-sentence test already mentioned and a follow-up sheet containing twenty practice sentences similar to the examples already given. If a student can do these satisfactorily, he is finished with appositives until the junior year.

In the junior year each boy writes and studies application letters. If he shows in his first letter that he knows how to use appositives correctly, he is given at once a final test on appositives, consisting of 15 sentences which illustrate the use of appositives in letters of introduction, application blanks, and application letters. The following sentences are typical of the others:

1. the bearer of this note mr james s johnson has been in the employ of the charleston shipbuilding and dry dock company for 13 years
2. references
   mr john h clark principal murray vocational school charleston 21 s c
   mr wallace c till instructor in charge of the auto shop murray vocational school
   mr julius p oliver assistant circulation manager evening post publishing company charleston s c
3. mr theodore eye and mr david burnett instructors in the machine shop murray vocational school charleston 21 s c have given me permission to refer you to them for information about my training as a machinist

If, however, a student does not remember his previous work on appositives, he must review the work of the preceding year; then he is given additional drills until he actually knows how to use appositives correctly in his written work. This type of student is usually interested in sports; he reads the sports page of his local newspaper and often is a member of the school's baseball, basketball, or football team. He is told to bring in ten sentences containing appositives, clipping or copying them from the sports page. His sentences will read like this one, copied and brought in by a student: "George Blakeman, team captain and high scorer with a two-season game average of about 20 points, again will head the cagers who have been among the nation's leading service court teams for the past two years." If he is a member of a football team, he can be told to write 11 sentences, using names of players as subjects and their positions as appositives. This assignment produces typical sentences like these: "George Campsen, right end for the Bantams, caught a pass for a touchdown" and "'Red' Espy, captain of the team, is a good sportsman." If a boy is interested in current events rather than sports, he can be directed to the front page of his local newspaper, on which he will find and copy ten sentences containing appositives; for instance, like the following: "The senate committee approved a modified version of an amendment written by its chairman, Senator Vandenberg (R. — Mich.)" or "David E. Lilienthal, President Truman's choice for chairman of the atomic energy commission, scored a major victory today when the senate refused, 52 to 38, to send his nomination back to committee for an FBI check." After having done some special work of this kind, the student usually becomes interested enough to complete his work on appositives.

During the intervening years between the first and second World Wars, trade and industrial education became established in a comparatively small way but on a firm enough foundation to absorb the impact of World War II and its unprecedented demand for trained workers.

The ability of our country to assume a position of leadership in the successful termination of this major conflict has been attributed in no small part to the splendid manner in which trade and industrial education responded to the demand for skilled workers. — *Harold J. VanWestrienen.*

This picture, "Northern Twilight," taken by Jordan Dombrowski, student at Evanston Township High School, Evanston, Ill., was awarded a Third Prize of $30 in Class IV — Animals and Pets — in the Third Annual 1948 National High School photographic awards

Problems and Projects

LETTER OPENER

HOMER C. ROSE
Falls Church, Va.

Letter Opener

Letter-opening knives, such as those shown in Figure 1, are popular as projects because of the small cost for materials and the wide variety of designs that may be adapted to the handle. Copper and brass are excellent metals for these projects, but stainless steel, aluminum, and cold rolled steel also are frequently used.

Several of the designs suggested in Figure 2 indicate a handle made of one piece of metal formed around the blade. This makes a very satisfactory handle and eliminates the need for soldering.

Procedure

1. Make a paper pattern of the size and shape desired for the blade of the knife and glue it to the metal.
2. Cut the blade to size.
3. Remove the paper and file the cutting edges of the knife to shape. A paper knife does not need to be very sharp; hence the cutting edge may be made with a short bevel.
4. Polish the blade with emery or other abrasive cloth.
5. Make a pattern for the handle of heavy paper or sheet metal.

In those designs where the metal is bent around the blade, layout for the handle should be made of scrap sheet metal and tried out before the copper or brass is cut.

6. Transfer the final pattern to the metal being used for the handle, and cut to the line with tin snips, fine tooth file, and emery cloth.
7. If the handle is to be soldered to the blade, coat both sides of the blade where it will be covered with the handle pieces with a thin coat of solder. Clean the handle pieces and coat the inside surfaces with solder. Then clamp all pieces in place with small *C* clamps, or hold them in place with weights, and sweat-solder the parts together. A blowpipe is recommended for this operation. Always place small pieces of metal of the same thickness as the blade between the halves of the handle where they extend over the blade, and solder them in place with the soldering copper. The *C* clamps should be left on during this operation.
8. File, polish, clean, and lacquer.

Alternatives

Small World War II insignia, collar and cap devices, including buttons denoting branch of the service, make excellent overlays for the handle of a paper knife.

Lapidary hobbyists may find it desirable to mount a suitably ground stone or series of stones on the handle.

Lodge and fraternal emblems may be worked into the design of the handle. In addition, a design relative to a hobby or profession might be used. For example, the G clef would be appropriate for a musician.

A combination of metals may prove desirable, such as a brass handle on a stainless steel blade; however, more than two metals on any one project should be avoided.

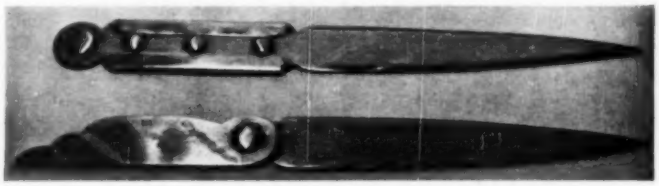
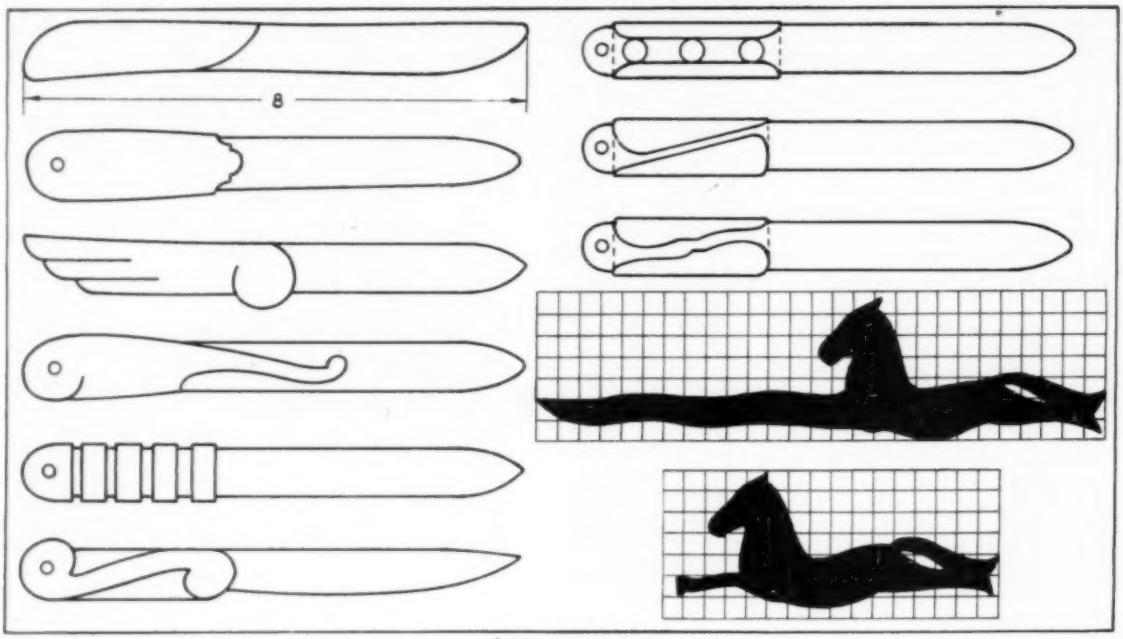


Fig. 1. Letter openers



Letter openers

A raised design in thin metal used as an overlay may be preferred by the more advanced craftsman.

A BABY CRIB

R. E. JENNINGS
San Benito County High School and Junior College
Hollister, Calif.

The crib described in this article should be mounted on 2-in. rubber casters. It is the standard six-year-old size, and has an adjustable gate and two drawers for extra clothing and bedding located beneath. The hardware for the gate can be purchased from any juvenile furnishing company at a reasonable price. In the event one does not wish to purchase the hardware, the gate guides can be made from 3/8-in. round steel with one end taped for a 3/16 by 1½-in. machine bolt. The machine bolt is run through the end boards of the crib. The locks may also be made from 3/8 rd. steel.

The crib is completely assembled with corner irons to facilitate moving, although any type of wood joint may be used. After two years of service the crib is as sturdy as ever.

If a large headed tack is inserted on the top of the back of the drawer, under the cover support, it will help the drawers slide more easily.

The springs may be set on the drawer cover, but adjustable springs may be purchased which will make it possible to raise or lower the spring as desired.

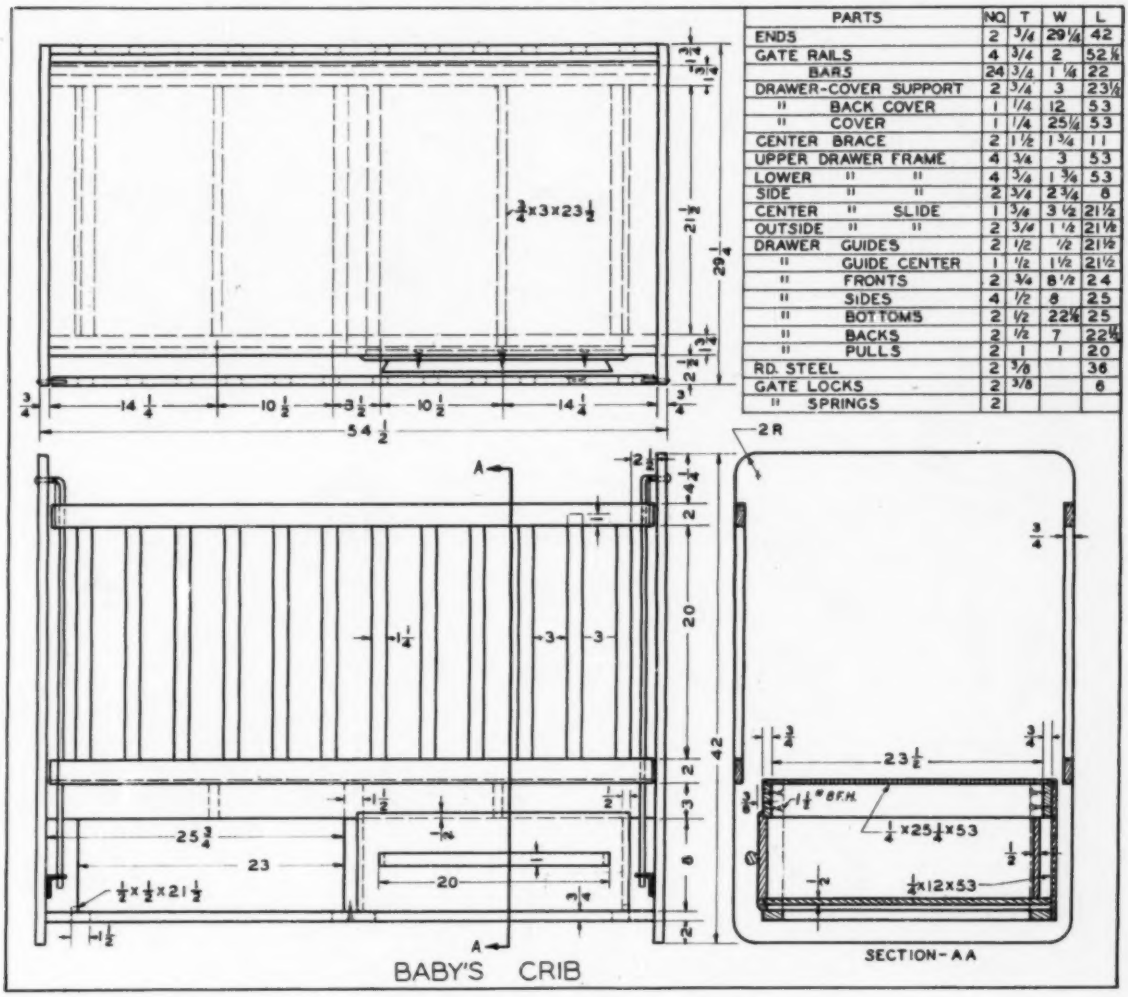
WHY NOT DISCARD CERTAIN SHOP TERMS?

LORENZO MENDICINO
Newell, Pa.

If a machine-shop teacher, and especially an old-timer, were in need of a taper plug gauge and a taper ring gauge, he would tell one of his students to go to the toolroom and get a *male* taper gauge and a *female* taper gauge.

Now just why these machine-shop teachers should want to use this terminology instead of the more proper terms *plug and ring*, or *internal and external*, is beyond one's comprehension.

We shop teachers know that tools are named for obvious reasons. If these same teachers who use the old type shop term for plug and



PARTS	NO.	T	W	L
ENDS	2	¾	29¼	42
GATE RAILS	4	¾	2	52½
BARS	24	¾	1¼	22
DRAWER-COVER SUPPORT	2	¾	3	23½
" BACK COVER	1	¼	12	53
" COVER	1	¼	25½	53
CENTER BRACE	2	1½	1¾	11
UPPER DRAWER FRAME	4	¾	3	53
LOWER " "	4	¾	1¾	53
SIDE " "	2	¾	2¾	8
CENTER " SLIDE	1	¾	3½	21½
OUTSIDE " "	2	¾	1½	21½
DRAWER GUIDES	2	½	½	21½
" GUIDE CENTER	1	½	1½	21½
" FRONTS	2	¾	8½	24
" SIDES	4	½	8	25
" BOTTOMS	2	½	22¼	25
" BACKS	2	½	7	22¼
" PULLS	2	1	1	20
RD. STEEL	2	⅜		36
GATE LOCKS	2	⅜		6
" SPRINGS	2			

Baby crib designed by R. E. Jennings, Hollister, Calif.

ring gauges, were to get up in a teachers' meeting and give a brief talk on the reasons why these certain gauges are called *male and female*, they surely would find themselves in a very embarrassing position.

The question may well be asked then, why use those terms before students, and why continue their use in our school shops? Let's discard them for good.

CHRISTMAS CARDS AS A PROJECT

EDWARD GORAB
Mechanical Drawing Instructor
High Schools
Pompton Lakes, N. J.

Christmas card making in a drawing class is an interesting activity outside the realm of the usual course of study. Since this project was so enthusiastically received and since it was an activity utilizing the techniques familiar in the usual course of study, I felt that other teachers of mechanical drawing might also want to use the idea.

Most classes in mechanical drawing take up the making of blueprints, and this process may be used in making the Christmas cards.

The first step is to design the card. To have the greeting and the face of the card in the proper position when folded, one should open an old Christmas card to see the relative positions of the four quarters. One must keep the limitations of blueprinting in mind when designing the card. The tones are blue and white with no in-between shading. As everyone who makes blueprints knows, the lines of a drawing will turn out white on a blue background.

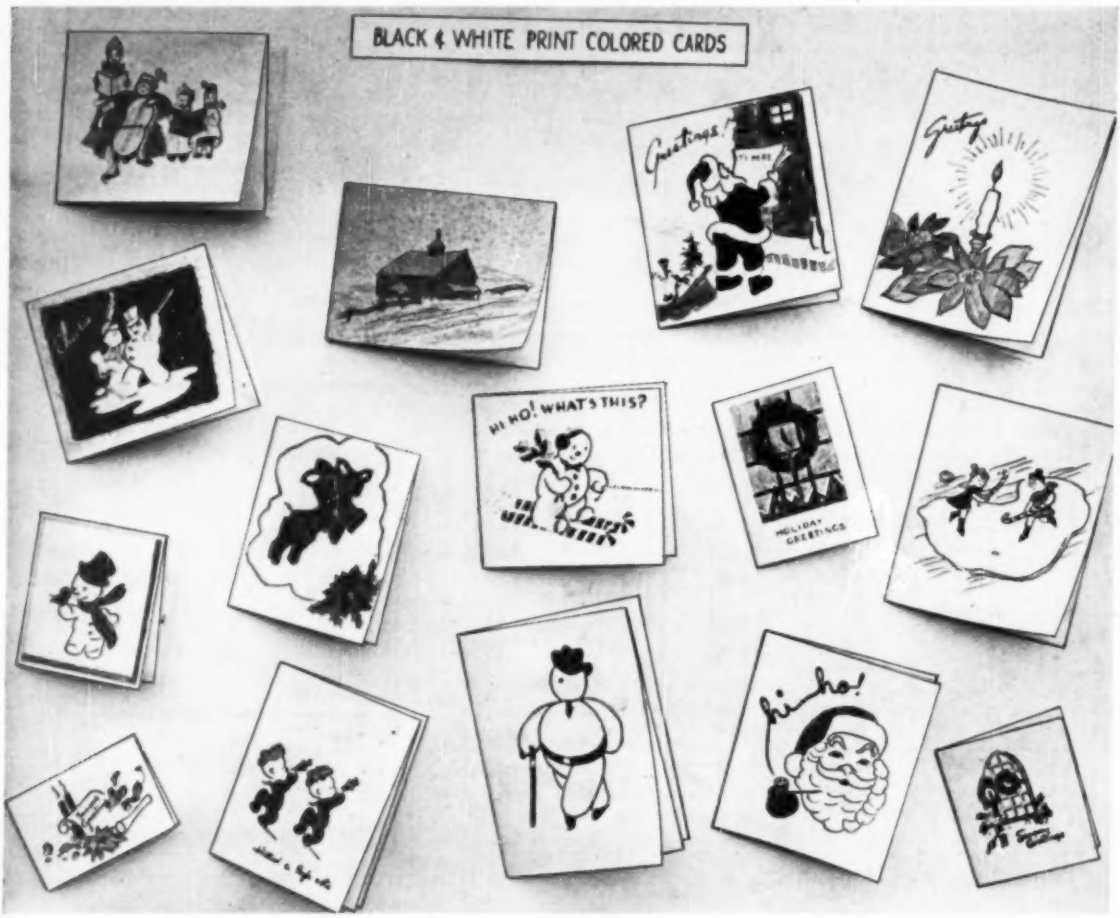
The next step is to make a tracing, preferably in ink to obtain the best results. This acts as a negative. Then a blueprint is made, and when dry, folded into a Christmas card. Of course, as many cards as desired can be made.

Envelopes may also be made from blueprint paper to match, by simply exposing the entire sheet, and getting the shade of blue by proper timing of the exposure. White India ink may be used for addressing them.

To get more colorful cards, one may use black and white print paper. A tracing of the designed card is made, after which a print is made. When dry, this may be colored with colored India inks, water colors, or pencils.

One can readily see that the black and white prints, colored, offer much more attractive Christmas cards. However, both will result in a worth-while project.

Another use of the blueprint machine is to make souvenir booklets for the annual exhibit which practically every industrial-arts program conducts. The problem of making a suitable design for these is presented to the class and the best one selected. A tracing is then made and it is used as the negative. At the exhibit, a few boys from the drawing class explain and show the process in making the blueprint and the black and white prints. When these prints are dry, they are then given out to the visitors.



Christmas and greeting cards

Still another project is to make bookplates either in blueprint or black and white print. Of course, they should be of a more suitable size, approximately 3 by 4 in.

Still another use for these prints is for poster work. Recently our poster club wished to make twenty posters on short notice. After the design for the poster was planned, a tracing was made and the required number of black and white prints prepared. The posters were then colored and filled in by hand.

DRAWER CABINET

E. A. RERUCHA

River Grove, Ill.

An inexpensive, but serviceable drawer cabinet for miscellaneous small items in the home and shop may be assembled from the drawout type of cardboard boxes. A variety of sizes of boxes may be used from match boxes to the larger boxes used by druggists, etc. After the boxes are assembled the over-all dimensions are determined and a wood cabinet made as shown in Figure 2. The type of box used is shown in Figure 1. Doors may be provided if desired.

Remove all the trays or drawers and give them a coating of shellac or glue and allow to dry. Hang up on nails driven in a board, while drying. Then cut strips of adhesive tape ½ in. wide and about ¾ in. longer than the length of the box. Stick this to the bottom of the drawer, in the center lengthwise, so that about ¼ in. may be turned upward in the back, as shown in Figure 3. Fold the tape over in front of the drawer ¼ in. and stick to itself. Staple the tape to the bottom with a stapler near the front end so that the tape will not work loose. Tabs for pulling the drawers out are thus formed.

If the drawers are of a dark color, paper stickers may be pasted to the front for lettering on the names of the various items in the drawers as shown in Figure 2.

Glue is used for assembling the outer case of the boxes. Assemble by pairs. Apply glue to the adjacent surfaces and clamp together with spring-type clothespins, as shown in Figure 4. Clamping them thus will make a straight joint and the drawers will slide freely. When dry assemble each pair again by two's until one vertical tier is completed. Then apply glue to the sides of each vertical tier and clamp on the sides. When dry assemble in cabinet. As the drawers wear out, because of hard use, they may be replaced by drawers taken from the same type of box.

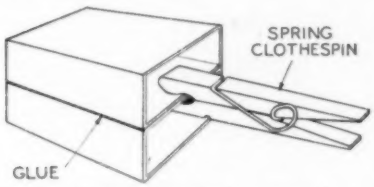
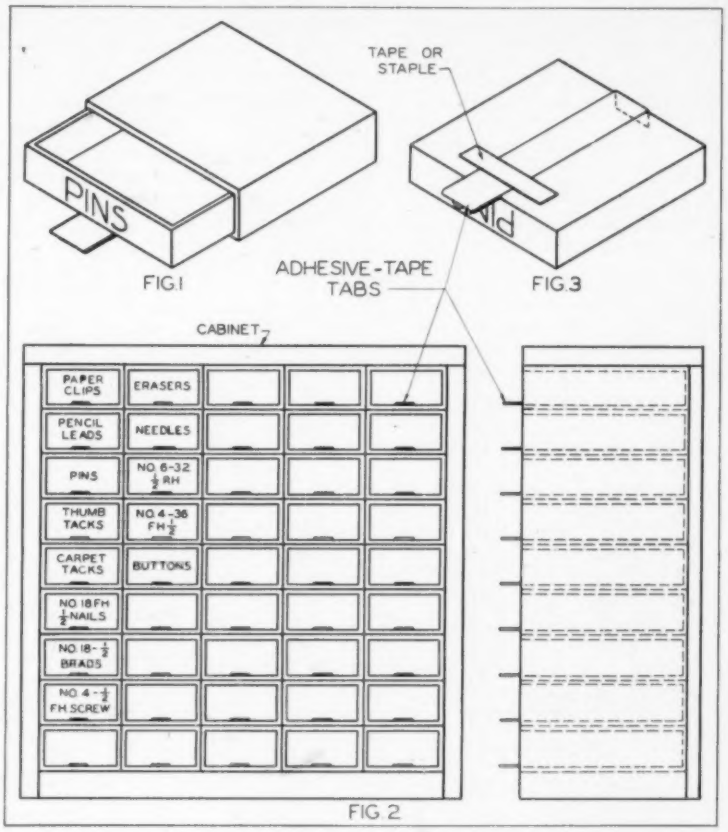


Fig. 4. Clamping the box cases for the drawer cabinets



Drawer cabinet

A large number of drawers may thus be provided in a minimum of space. Stamp collectors, and coin collectors may find such a cabinet useful for storing unclassified stamps or their surplus.

After assembly the cabinet and the front edges of the box cases should be painted. The fronts of the drawers may be painted a different color before the stickers are applied.

The final result is a well-appearing and handy cabinet for housing a multitude of small objects.

PLANTER LAMP

L. BRYCE HARDEMAN

Industrial Education Department

A. & M. College of Texas

College Station, Tex.

Metal spinning, although it may be a phase of shop laboratory work not experienced by the majority of industrial teachers, possesses a great interest for both the teacher and the student. It can be done on any wood lathe that has good bearings in the head stock. It is also a helpful morale builder for the teacher who has become tired of teaching the same course over a period of time, and who is looking for a new unit which will stimulate interest for himself as well as his students.

Planter lamps have become very popular in home decoration. Since they are relatively simple to make, they have widened the field of metal spinning projects. The one shown has an attractive, functional design which has an immediate appeal.

The cost of the lamp, without the shade, is reasonable.

BILL OF MATERIAL

No. required	*Item*	*Description*
1	Brass disk	7¼-in. diam., 22 ga., soft yellow
1	Brass disk	8½-in. diam., 22 ga., soft yellow
1	Brass pipe	¼ by 11 in.
2	Brass nuts	9/16 in. N. C.
2	Washers	9/16 in.
1	Light socket	Brass (push button)
1	Pipe nipple	¼ by ¾ in.
1	Lamp harp	Brass plated (to receive 150-watt light bulb)
1	Bushing	(For lamp cord going through side of lamp base)

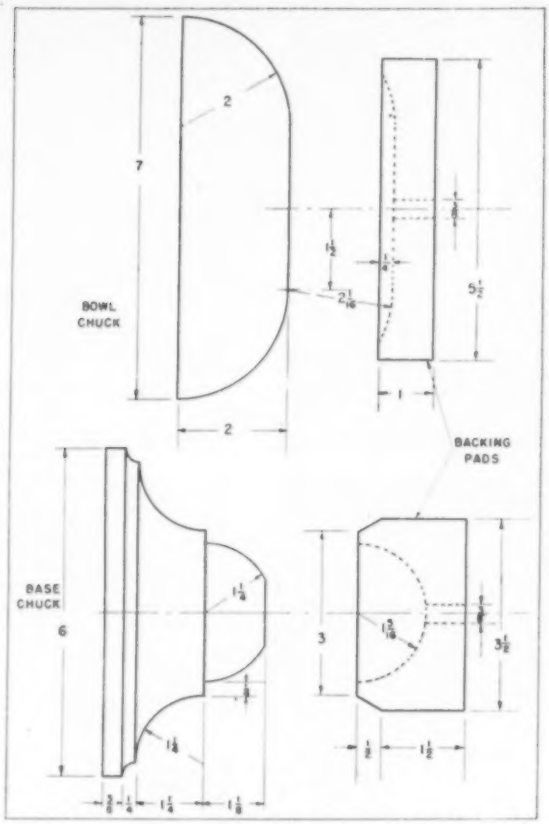


Fig. 1. Details of spinning chucks

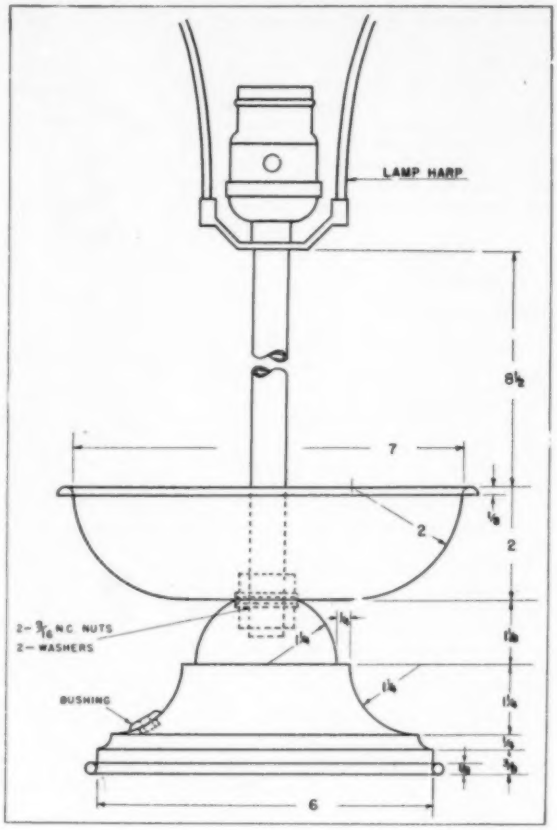


Fig. 2. Details of planter lamp

The following steps suggest an efficient and easily followed plan of procedure:

1. Select hardwood stock for spinning chucks and backing pads. Hard maple is preferable.

2. Fasten the chuck stop securely to the lathe faceplate. Turn it to the size and shape desired. See Figure 1.

3. Turn the backing pads to the shape desired. One each of 1 by 3½-in. diam., and 1 by 5½ in. in diam. Allow 1/16-in. clearance for the sheet brass, Figure 1.

4. Cut two disks of 22-gauge soft, yellow brass. Make one 7¼-in., the other 8½-in. diameter.

5. Center the 8½-in. brass disk on the chuck, using the 1-in. backing pad to hold the disk in position.

6. Spin the bottom portion of the bowl to approximately 5½ in. Lubricate it often with beeswax.

7. Remove the bowl from the lathe and anneal it by heating it to a dull red color and then quenching it in water.

8. Replace the bowl in the lathe. Hold it in position with a 5½-in. backing pad. Lubricate

Planter lamp by L. Bryce Hardeman

it and spin until the brass begins to harden.

9. Remove the bowl and anneal as often as is necessary to keep the metal soft enough to spin well. NOTE: The bowl will need annealing approximately seven times during the total spinning process.

10. Sand the bowl with No. 2/O sandpaper while it is still in the lathe. Allow some beeswax to adhere to the sandpaper; this gives the metal a higher gloss finish, and eliminates a *frosted* appearance.

11. Remove the bowl from the lathe.

12. Replace the bowl chuck with the lamp base chuck.

13. Spin the lamp base in the same manner as the bowl.

14. Cut a piece of ¼-in. brass pipe to 11-in. length and thread the lower end for a distance of 1 in. with 9/16-in. N. C. thread.

15. Tap the upper end of the pipe with a ⅛-in. pipe tap to receive the short pipe nipple and socket.

16. Secure or make two 9/16-in. brass nuts approximately ¼ in. thick.

17. Drill a hole for the electric wire in the base; tap for a bushing with a ⅛-in. pipe tap.

18. Buff all of the parts with a buffing wheel.

19. Apply clear lacquer to all polished areas.

20. Assemble the planter lamp as shown in Figure 2.

ALUMINUM JEWEL BOX

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Senior High School
Red Bank, N. J.

The qualities of aluminum intrigue youth no less than they interested Napoleon III. The school shops can teach the properties and processes of this metal without much trouble in the school shop.

The aluminum jewel box shown here, was designed to produce a pleasing effect. It may be made of 18 B. & S. gauge (.040 in.). It can be successfully made in a minimum of time.

Learnings sought or reviewed:

Ability to use a screw driver safely
Ability to assemble with wood screws and avoid splitting
Ability to lay out centers
Ability to drill on punched center
Ability to select clearance drills
Ability to select proper length rivets
Ability to devise and use simple jigs
Ability to lay out bend lines
Ability to form and fasten thin metal
Ability to finish aluminum
Skill in avoiding surface marks during process of construction
Skill in the use of the combination square, center punch, rivet set, riveting hammer, and various files
Knowledge of simple decorative processes suitable for aluminum
Knowledge of adhesives
Understanding of the qualities of aluminum, such as: lightness of weight; ease of forming; ease of finishing; and permanence of finish.

The student should also acquire an appreciation of an article requiring considerable handwork, and an appreciation of the relationship between cost of handwork and mass production.

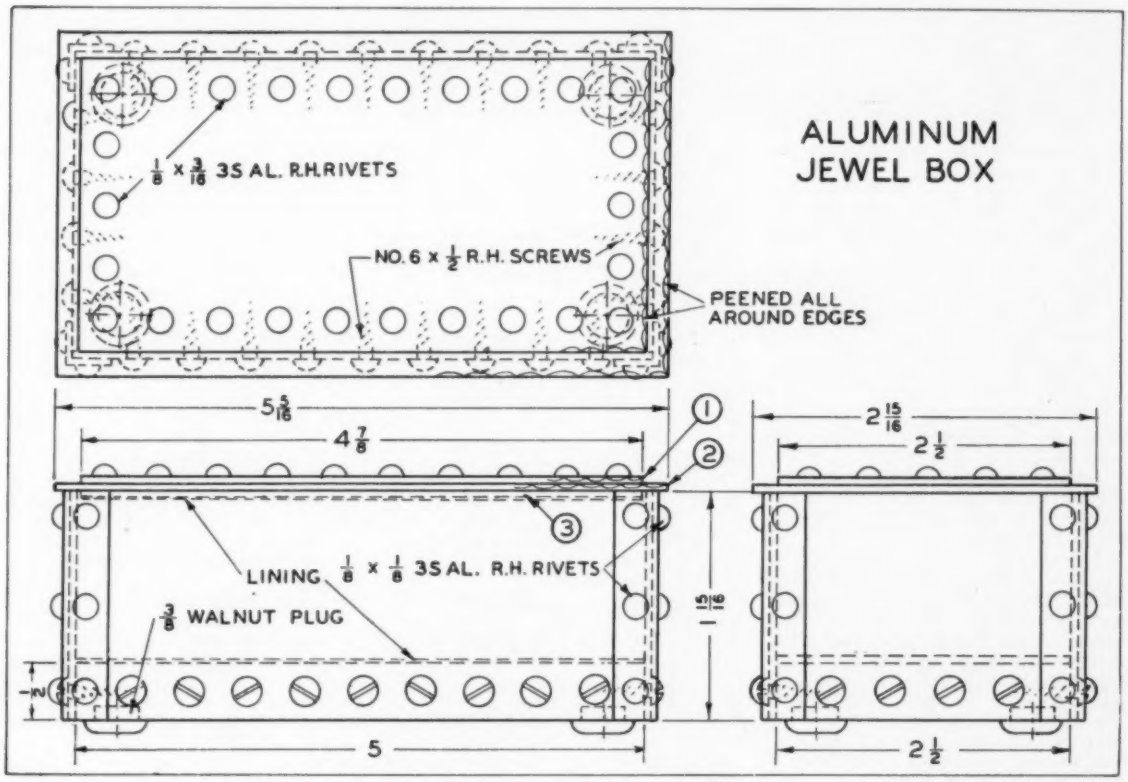
Method of Procedure

1. *Prepare the wood base.*

2. *Prepare and assemble sides and ends to base.*

a) Scribe centers for assembly holes along base edge of side. End holes are located in steps 3-e and 3-f.

b) Punch, drill, remove burrs, and ream assembly holes. Use clearance drill No. 25 for No. 6 screws.



Details of aluminum jewel box

BILL OF MATERIAL

No. required	*Name*	*Material*	*Size*
1	Bottom	Walnut	½ x 2½ x 5
2	Side	Aluminum	.040 3S 1 15/16 x 5
2	End	Aluminum	.040 3S 1 15/16 x 2 9/16
26	Wood screws	Aluminum or nickel plated	R.H. No 6 x ½
4	Corner trim	Aluminum	.040 3S ¾ x 1 15/16
24	Rivets	Aluminum	3S R.H. 1/8 d x 1/8
26	Rivets	Aluminum	3S R.H. 1/8 d x 3 1/16
2	Top	Aluminum	.040 3S 2½ x 4⅞
1	Top	Aluminum	.040 3S 2 15/16 x 5 5/16
1	Lining	Velour	2½ x 5 1/16
1	Lining	Velour	2½ x 4⅞
		3-M Trim cement	
	4 ft.	Walnut screw hole plugs	3/8
		Steel wool	3/0
		Turpentine	

c) Scribe center line for assembly holes along edges and ends of wood base.

d) Use sides and ends as templates to complete location of centers of assembly holes.

e) Use No. 32 drill for 24 holes for No. 6 wood screws.

f) Assemble.

g) Lubricate screw with soap. Avoid burring slot of screw head.

3. *Preparation and assembly of trim*

a) If corners are to be decorated, finish that before assembling.

b) Lay out rivet holes on corner trim, punch, drill, ream, and remove burrs. Use No. 29 drill for 1/8-in. rivets.

c) Locate bend lines.

d) Bend corner trim. Use hardwood blocks, machinist's hammer, and machinist's vise.

e) Clamp corner trim in place in box assembly. Use machinist's vise and protective blocks. Drill one hole. Rivet.

f) Repeat Step *e*, one rivet at a time, until all rivets are driven, except those along the wood base. Check frequently for square corners.

g) Remove the wood base. Drive the remaining rivets. Replace the base.

h) Prepare and assemble any additional decorative parts desired.

4. *Preparation and assembly of lid*

a) Hammer decorative effect on Top 1 and Top 2.

b) On hammered side of Top 2, scribe guide lines for locating Top 1. Use a very sharp pencil.

c) On the other side of Top 2, scribe guide lines for locating Top 3.

d) Scribe locations of rivets on Top 1. Punch scribed locations.

e) Clamp Tops 1, 2, and 3 together in preparation for drilling and riveting. Hold in machinist's vise. Use protecting blocks. Use hand drill and No. 29 drill. Place the first rivet in a corner. To avoid buckling, proceed by drilling two holes and driving two rivets as one operation — one rivet to be along each edge leading away from the corner.

5. *Completion of the project*

a) The box may be hinged if desired.

b) With files and steel wool adjustment of any unevenness may be made.

c) Cut velour to fit bottom. Cement velour in place.

d) All surfaces should then be polished with steel wool.

Suggested helps with the procedure

1. *Preparation of rivets*

Various metal gauges and number of sheets or metal thicknesses require different rivet lengths. To avoid an excessive inventory of lengths, longer rivets are readily cut to size.

To cut rivets to size, make a jig by bending or combining the number of thicknesses of metal to be riveted. A 4-in. length makes a convenient jig to hold. Drill a rivet clearance hole, near the end of the jig, through all of the thicknesses.

Place rivet in the jig. Cut off excess length with diagonal cutting pliers. Turn head of rivet down on wood vice block; file cut end flat. This procedure produces a rivet head that fills out into the countersunk space and finishes even with the surface of the riveted sheet. The correct cutting length will quickly be determined by cutting and driving several experimental rivets.

2. *Countersinking and burr removing tools are readily made by cutting larger drills to convenient lengths, or by grinding to shape three square files.*

3. *Making rivet sets*

Rivet sets may be made from ½-in. diameter drill rod. Drill into one end until the depth of the rivet head is approached. The drill should be a few thousandths larger than the diameter of the rivet head. For the final cut, the lips of the drill should be rounded to the shape of the rivet head.

By similar procedure rivet sets may be made for cone or any other type of head.

The rivet set becomes a permanent shop tool by case hardening, hardening, and tempering at brown shading into purple.

4. *Driving the rivets*

a) Burrs may be removed from the drilled holes with ¼-in. or larger drills. Such burrs may be cut off with a Sloyd knife on aluminum metal.

b) If a flat head, even with the riveted surface, is desired, countersink the rivet hold.

c) Rivets may be driven to have both heads clean and smooth by using a vise block, machinist's vise, machinist's hammer, rivet set, and leather.

5. *Hammering aluminum*

a) An effective decorative edge is obtained by use of a ball-peen hammer. Place the part on an anvil. Strike exactly on the edge. The blows must progress along the edge so that the ends of the indentations just meet. By increasing the force of the blow, a broader effect is obtained.

b) The entire face of the corner trim strip, or other decorative part, may be hammered. Use either a ball-peen hammer or a vibrating tool.

c) Hammering gives the effect of added thickness to thin stock.

THE POTTER BEGINS THE CASTING PROCESS

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Chicago Teachers College
Chicago, Ill.

Hydroscopic action is the physical force which the potter studies and employs in his work. He must learn to recognize this action which takes place between two different materials and between two different masses of the same material. It will appear to him that two things are struggling for mastery. He will discover that it depends, in part, on the relative quantities of water in the two things. By controlling these amounts he will be able to use this force to his advantage.

In porous material the water tends to move about and to equalize by absorption throughout the material. The more water a dry clay will take up without becoming muddy, the more plasticity it will have. The less plastic clays are called "short" and the more plastic are known as "long." A long clay can be made short or less plastic by the addition of mild alkali such as soda ash, sodium silicate or waterglass, and sodium carbonate or baking soda. This is due to the fact that silica and silicates are chemically acid.

Silica or quartz, the formula designation for which is SiO_2, comprises a portion of all clays. Silica combines readily with many materials used in pottery. These combinations are controlled by using formulas which set up relations between the elements of a mixture. They balance and oppose the chemical forces in the different materials. Most of the materials used are not soluble in water, but they may be suspended in water if the size of the grains is small. Clay material grain sizes run from .0025 to .005 of a millimeter. The grains must touch over a large part of their area or they will not fuse into a resonant mass in the firing. These fused or melted-together materials form a solid solution as distinct from a watery or aqueous solution.

The potter, therefore, mixes and suspends his materials in water so that he may work them into the shapes he desires; he dries the excess water out and fires the clay in his kiln into partially or wholly solid solutions. The glaze materials which are soluble in water are less predictable as to their action in the kiln. For this reason the potter, and especially the beginning potter, avoids the use of water solubles. He has learned that they are easier to handle if they are fired into solid solutions

before they are mixed into clays and glazes. Of course they must be ground again to fine grain size before they are used. Glazes should be fine enough to pass through a No. 120 mesh screen. If they are much finer than this they may crawl or leave bare spots on the biscuit ware. Agitation in water tends to make the grain size smaller.

Slip Casting

The reader will see that several of the aforementioned forces are involved in slip casting using plaster of Paris molds. The potter uses this device to make replicas, duplicates, and variations of types of traditional pottery. Plaster of Paris is a powder which, when mixed with water, will harden into a solid mass. After it has hardened it holds some of the water in chemical combination while the remainder will evaporate. The dry cast will again absorb a considerable amount of cold water without affecting the solidity of the cast to any great extent. Boiling water and hot water will crack and disintegrate the plaster. This is because some of the water of crystallization is driven off by the heat.

Slip is a watery mixture of clay materials. The insoluble clay material particles are merely suspended in water when agitated. Water-soluble alkaline materials, such as soda ash and sodium silicate, are added when the potter wishes to make the clay hold less water. This process is called defloculation. Acid is added to floculate the clay.

There are several kinds of plaster molds each made to conform to certain aspects of the models or patterns. In making white ware, molds are used to facilitate the manufacturing of sets of dishes and other duplications.

Patterns which have no undercutting may be reproduced and duplicated in single-piece molds. Any part of a pattern which is so shaped or is of such size that the cast article cannot be lifted from the mold opening without damage is said to be "undercut."

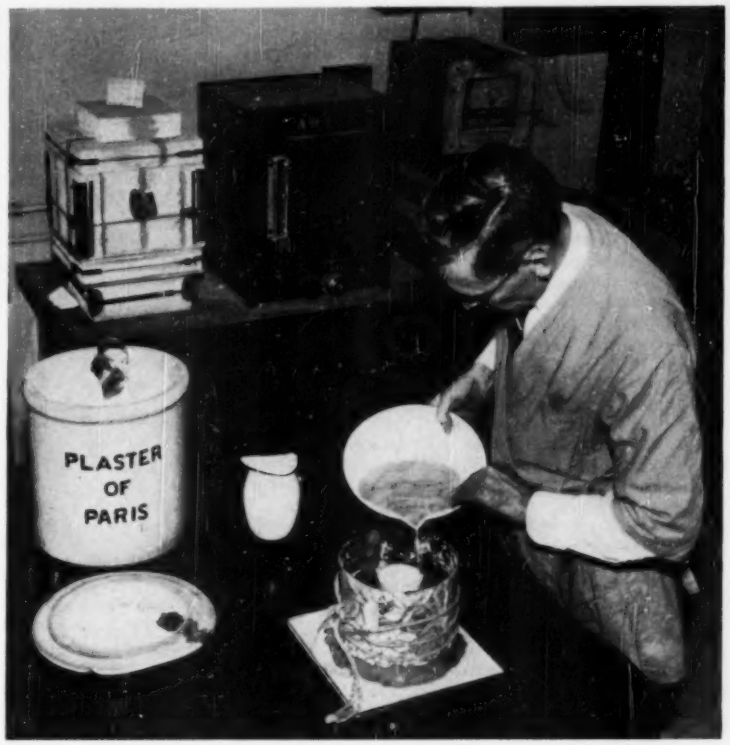
Rounded forms which fall naturally into equal hemispheres may be cast successfully in a mold made of two or at most three pieces. Modeling of figures and other forms containing intricate undercutting may require many parts to the mold. Small areas of such models which contain no undercutting are first dammed off and cast separately. The parts of such molds are joined by keys which are cast with the parts of the mold. They are assembled for use in reverse order from that in which the parts were made.

Plaster molds of any number of parts are all used in about the same way. Molds are used to shape sheets and masses of clay. Some iron molds are made to hold damp clay powder under great pressure.

The following explains the making and use of a simple one-piece plaster mold to use in slip casting.

To Make a Mold

The first step in mold making is to provide a model made of clay or other smooth substance. It would be wise for the beginner to make up a cylindrical form of clay for this purpose. A mold made from this cylinder can be used to make several different objects. The model or "hump," as it is called, should be a perfect cylinder of solid clay 3 in. in diameter by 8 in. long. The surfaces should be smooth with the end surfaces at right angles to the axis of the cylinder.



— Murrell Tinsley

The potter at work

Three eighths of an inch down from one end, cut a slight groove equal to the thickness of a pencil lead around the cylinder. Stand the mold down upon this end on a smooth table while a foot is cut in the opposite end. First scratch a line ¼ in. from the outside edge on this end surface. Then cut away all the clay within this circle to the depth of not more than ⅛ in., leaving the remainder of the end flat and smooth as possible. The mold is made with the hump in this position, i.e., with the foot uppermost. The hump is placed, on end, on a smooth surface which has been previously painted with a thin soap solution over an area of 10 in. in diameter. The hump is placed in the center of this soaped circle.

A strip of scrap linoleum 10 by 26 in., the right top surface of which has also been painted with the soap solution, is formed into a hollow cylinder with a diameter of 7 in., and with the ends of the strip overlapping about 3 in. At the bottom and top corners of the linoleum fasten all smoothly together with paper clips. You will need four of these. Now wrap a heavy cord from the bottom of the cylinder to the top with at least five turns around it and tie the ends securely.

This hollow cylinder is placed over the hump and down on the table so that the hump is in the center of the cylinder. This hollow form, with the hump standing on the top end inside of it, is the container into which you will pour a mixture of plaster of Paris and water. But first it is necessary to seal the joints so that it may not leak. Take ¾-in. rolls of scrap moist clay and seal the joint outside the cylinder all around where the linoleum touches the table. Also seal the inside edge where the end of the material overlaps. First press the clay down on the table and then against the linoleum while holding the fingers of one hand inside as you press with the other on the outside. The sealing of the joints must be done thoroughly.

This mold form will hold about 4½ qts. To make this quantity, use 4 qt. of water and 9 pounds of dry plaster. Pour the water into a wide-mouthed pan, and sprinkle the dry plaster over the surface as rapidly as the water will absorb it. When the plaster is all absorbed, stir slowly to avoid lumps and bubbles of air in the mixture. Do not pour the mixed plaster into the mold until a test shows that it is ready, that is, until the plas-

ter begins to set. It is then creamy in texture.

The fingers of one hand are frequently submerged in the plaster for the test and are at once withdrawn and closed loosely so that the fingers are bent. If the plaster on the knuckles runs off, the setting has not gone far enough to pour well. When the mix will completely cover the knuckles after the fingers have been bent, the plaster is ready to be poured immediately into the mold. Pour steadily and with little splashing. Scrape the pan with the fingers, and immediately rinse the pan, preferably with hot water. Allow the water to run until the pan, sink, traps, and pipes are washed clear. If this is not done, the services of a plumber will be required.

Plaster of Paris is sold in three different grades, each setting at a different rate. Medium or fast-setting plasters are recommended. Old plaster of any grade is worthless. Allow the plaster to set, firmly which will take from 20 to 30 minutes.

The cord may now be untied and the linoleum unwound and lifted clear of the mold. The cast is turned over and the clay dug out with a blunt tool. Do not damage the surface of the plaster with the tool. The fingernails too will damage the inside of the mold if one is not careful. All of the clay must be wiped away from the inside and top surfaces. A moist cloth and a soft brush dipped in a solution of two ounces of soda and eight ounces of water will help greatly. The cast is now placed on small wood strips to dry, which requires from four to five days in a warm room.

Mix the Clay Slip

The slip should weigh about 28 oz. to the pint. Use 12 oz. of dry clay to a pint of water. This mixture must be soaked, stirred, and strained until it is free from lumps. Most potters make up a jar of slip several days before it is needed. A cover on the jar will keep down water evaporation. If the slip seems too thick a little water may be added.

Enough of this smooth slip is put into an enameled pitcher to more than fill the plaster mold. The dry mold is placed right side up, and slip poured in steadily until it is level full. As the mold works on the slip, the level at the top will slowly sink. This depression is quickly filled with added slip until the deposit on the wall of the mold is the thickness required, in this case about ¼ of an inch. To test, the slip may be poured back into the pitcher, and then the clay deposit will be visible. The slip is poured in again, if needed, the same as before.

When the deposit is right the mold is emptied and inverted over the slip jar on two wood strips to drain. The inside of the mold is at first glossy with water, but, after it has drained a few minutes, the clay surface becomes dull because the plaster continues to absorb water from the clay. The mold will now further dry the clay until it shrinks away from the plaster. Scrape the top surface of the mold free from any clay and clean with a dry cloth to the edge of the clay cast. When the clay has shrunk away from the bottom of the mold, the cast can be taken from the inverted mold. Since it is soft and easily damaged, it should be placed on a plaster batt in the dry box to harden by slow evaporation. With a dry mold and by using ready mixed slip, a cast can be made and released from the mold in about an hour. When the cast is dried, leather hard, the top can be trimmed by slowly cutting down to the groove and the chipping edges removed from top and bottom. By sponging lightly and scraping where needed, the inside and outside surfaces are finished as desired. The piece is now slowly dried in the dry box to avoid warping and cracking, after which it is fired. After the first firing, which is called *biscuit firing*, it is covered with glaze and then glaze fired.

Further Use of the Mold

A mold of the kind described in the foregoing can be used to make tall cylindrical vases, medium and tall pitchers, and cups. The full-height cast is flared out at the top or worked into a narrower top or into any contour the potter desires. The pitchers are made by flaring out a pouring lip and attaching a handle.

The mold need not be poured full at all times; ⅝ full will make a medium-sized pitcher; ⅓ full, a cup. The slip is kept at a constant level at any predetermined height until the deposit is built up, then poured out, drained, shrunk, and removed from the mold. About 10 per cent of the shrinkage is due to drying and firing. The walls may be scraped thinner if desired, and decoration may be added. Any firing clay may be used to make slip. If white-bodied ware is desired do not use a red-clay slip at first in the mold because the plaster will absorb color from the slip and give it off to a lighter colored slip afterward.

Two prepared slips, one white and one red, may both be used in the mold. The white is poured in the dry cast first. This is poured out when a thin deposit is left, followed by the red-clay slip which is left in until the deposit is the thickness desired. Two layers or even three may be built up in this way. These extra layers are called *engobes*. The outer layers, of course, are the ones that are visible except on the top edge of the cast. This edge can be covered later by brushing the desired color of slip on to the leather-hard clay with a brush. Slip painting is different from water-color or oil-color painting. The clay is deposited from the brush in much the same way as it is deposited on the plaster mold.

IMPROVED COPING-SAW JIG

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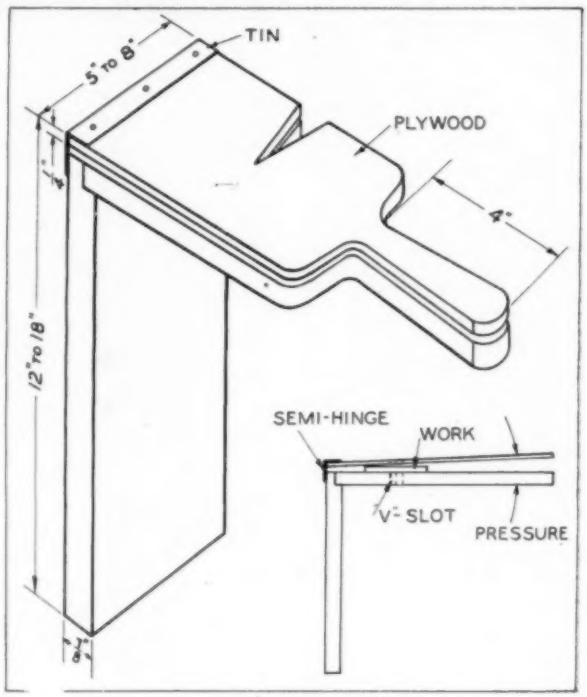
The saw jig is ever with us in one form or another. When used for sawing wood, plastics,



Improved coping-saw jig

and soft metals, with a coping saw or a jeweler's saw, there is always the difficulty of holding the material during the return stroke. Most blade breakage results when the material *hops* up from the surface of the jig.

The hopping has often been overcome by the use of a *C* clamp. But when a clamp is used some form of protection must be given to the surface of the material so that it will not be marred by the jaw of the clamp. Whenever the material has to be moved, three hands are frequently needed.

The improved coping-saw jig shown herewith, has overcome some of the handicaps mentioned. The plywood top, semihinged to the work surface, provides a tremendous pressure by means of the handles. This pressure is sufficient to hold wood, metal, or plastics in position for sawing.

It has been successfully used by small children who ordinarily have insufficient finger strength to hold material for sawing.

The dimensions given show the ordinary range, but variations using the same grip principle may be substituted. Thus, these jigs may be made long and slender, wider, left and right hand, and with or without base for table use. The same clamping principle can be used for *hold-down* appliances for the drill press.

One-inch flathead nails will hold well for the hinge if they are clinched to the plywood. Screws, bolts, or rivets may also be used. Rabbeting the work surface into the upright and placing an angular supporting piece across the joint will insure rigidity.

INDIAN SILVERSMITHING

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(Continued from page 370 of the November, 1948, issue)

Brooches

Indian silversmiths make many brooches nowadays and some of them are very unique. Some are made very naturalistic while others are more or less symbolic in design. The five shown in Plate 31 represent a fairly good cross section of the types that are made. While the butterflies, shown in Plate 31, are symbolic, the lower June bug and the dragon fly are quite naturalistic, and the bird represents an abstract design. In fact, the bird looks as though it were made from a discarded silver button.

The bodies of the butterflies and the dragon fly are made of half round wire, hammered and filed to the taper shown. A *U* shaped piece of silver forms the eyes of the upper one and the lower ones have the heads filed and the eyes soldered on later.

In the upper butterfly the body was filed down to form a flat base for the setting. After the wings and the bodies of the butterflies were stamped, they were soldered while still flat. The feelers are soldered beneath the head and wings. The slight rounding of the wings is done on a block of maple wood from the reverse side.

The wings of the dragon fly are left flat. The June bug is made with a dapped out half

Butterfly brooch

sphere for a body, and the head is also a small half sphere with raindrops soldered on for eyes. The wings are slightly less than one quarter spheres. They are set away from the body.

A word about rounding the wings. It is a natural tendency for everyone to want to hammer them out with a ball-peen hammer. This practice, however, produces a lot of small bumps which cannot be filed out in a satisfactory manner. The one in the photo was hammered out with a stamp of ½-in. round steel slightly rounded at the end. The hammering was done from the back on a hardwood log end by moving the stamp back and forth. It doesn't take much pounding if the wings are made of 24-gauge metal. A stamp made of maple wood would do the trick just as well.

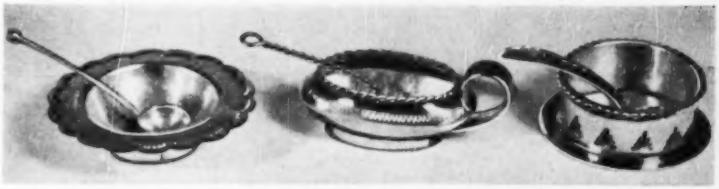
Arm Guards or Ketos

The arm guard, or keto, as the Navahos call it, is the next project to be described. Ketos are not seen so much nowadays. They belong to the days of the bow and arrow, and the silver keto is merely a symbolic decorative article which represents the leather arm guard worn to protect wrist and arm when shooting with the bow and arrow.

At *D* in Plate 32 is shown a wide leather band that can be worn with one of the silver ketos shown. At *E* is pictured a silver keto that is heid on with two leather straps. Ketos of this kind are now used as bracelets, which are quite frequently worn by the Indian men. The two narrow straps are much cooler, of course, than the wide leather band.

The ketos shown in Plate 32 were sketched with the permission of the Santa Fe Museum. Many of those shown at this museum were of cast silver. The ones shown at *A* and *B* in Plate 32 are of wrought silver, and the one at *C* is a wrought design adapted from a sketch made from a cast silver keto on exhibition at the museum. Invariably the wrought ketos have a half-round wire soldered around the outer edge. This not only adds strength to the thin sheet of silver, but gives a more substantial appearance to the finished article.

Fig. 1. Showing how the keto is curved to fit the wrist



Saltcellars and spoons. See article on page 370 of the November, 1948, issue

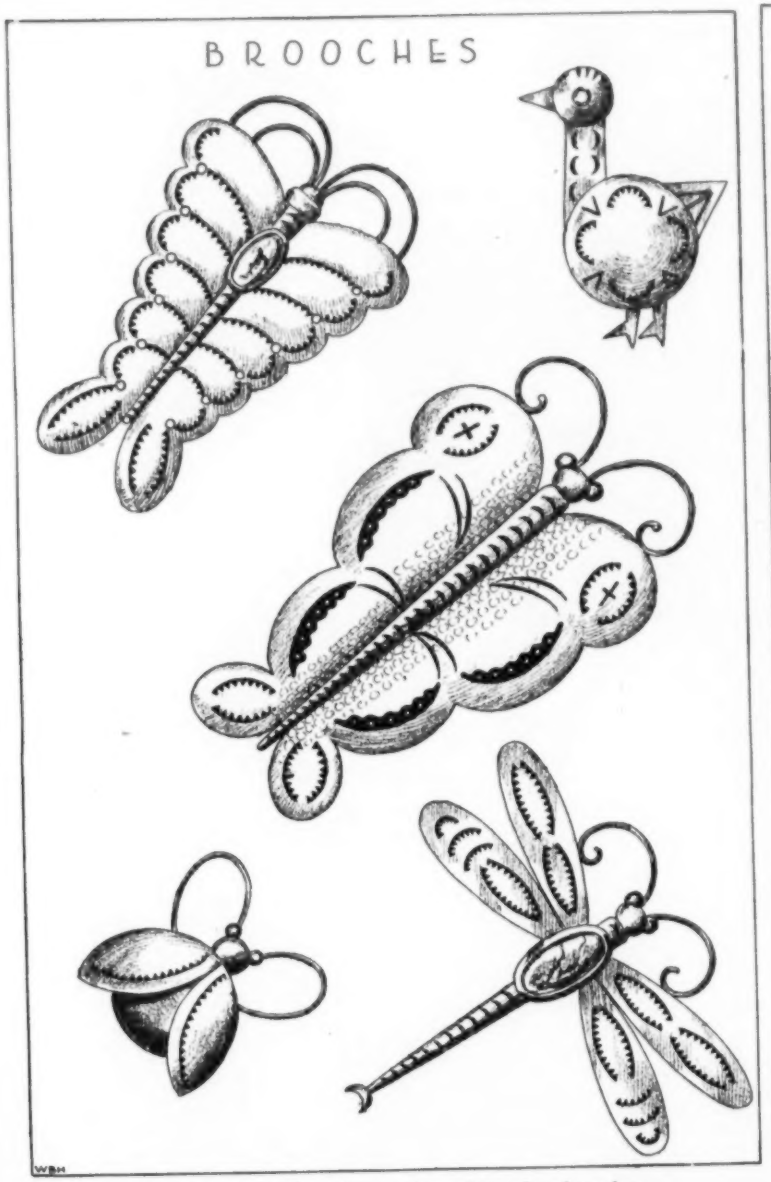


Plate 31. Butterflies, dragon fly, and June bug brooches

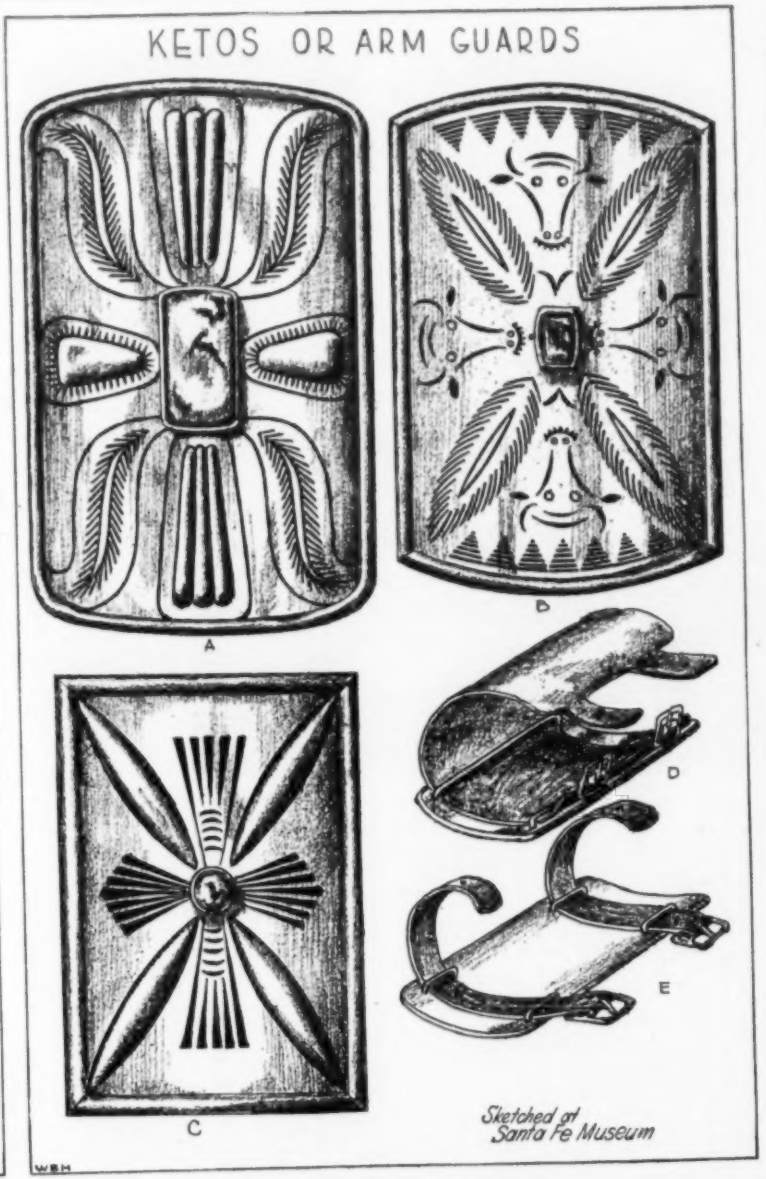
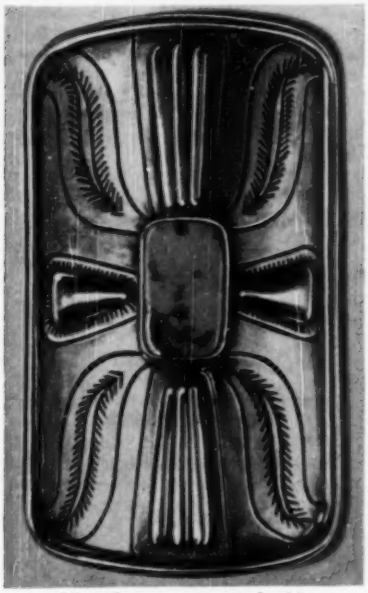


Plate 32. Silver ketos or arm guards



Silver keto ornamented with turquoise setting

To make the keto shown at *A* make a tracing of the entire design. Then transfer this to a piece of 20-gauge silver, using ordinary typewriter carbon paper. Next transfer the same design with carbon paper, to the end of a hardwood log, or trace it on the end grain of a hardwood block. With a small gouge, carve out the triple bumped up design, and the one at the side. Only one of each of these needs to be carved, but care must be taken to carve them in the right position, so that when the one set has been bumped into the silver, the blank need but to be turned halfway around for the second bumping operation.

The stamped ornamentation must, of course, be put on before any bumping is done. After the bumping has been finished the plate must be touched up with a file, if necessary, and then polished to a good finish. After that has been done, the half-round wire should be soldered around the outer edge.

If no half-round wire is at hand, some can be made readily by filing a round groove with a small rattail file into a block of steel, after which a piece of 10-gauge wire should be hammered into the groove thus forming a half-round wire that will be quite acceptable. Keep moving the wire along as it is hammered, and then finish it up with a file to take away the irregularities.

When the soldering of the half-round wire has been completed the keto should be rounded over a rounded piece of hardwood until it fits over the wrist and arm as shown in Figure 1.

The next step is to put on the turquoise. The stone may be shaped on a carborundum stone and then polished with fine carborundum cloth. The final finish may be given to it with tin oxide and water on a piece of buckskin.

The wire loop or loops are soldered on last. Indians use heavy flat or round copper wire for these loops.

The keto shown at *B* is quite simple to make since it requires no bumping at all. It would look quite well even without the turquoise setting.

In making the one shown at *C*, the bumped up ornamentations may be made separately and then soldered on, as was done on the belt buckle described on pages 131, 132, and 133 in the March, 1948, issue.

If necessary, the buckles for the straps may be made of 14-gauge wire. They may be bought ready made, of course, but Indian silversmithing is usually done by persons who love to make things themselves.

ELEMENTARY AUTO MECHANICS

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(Continued from page 381 of the November, 1948, issue)

Assignment Sheet No. 25 — Removing and Replacing Overhead Push Rods and Lifters

Why this is done: In order to clean and examine the lifters, and in most cases to protect the push rods during a motor overhaul, these parts must be removed from the motor.
Procedure:

1. Remove the push rod lock plates, if any.
2. Lift the push rods out of the lifters just after the rocker arm assembly has been removed and while the cylinder head is still in place. Take care of any removable parts, such as Chevrolet push rod caps, Nash steel balls which should be *left in the lifters*, and the washer, spring and horseshoe key assembly of Buicks.
3. *If* removing the lifters (check the job sheet carefully on this point), check to see that the lifter guides are numbered, and, if not, get instructor's assistance in numbering them before removing.
4. Remove lifter guides and lifters by pulling straight up. Sometimes a very light tapping with a hammer and wooden block is necessary to loosen the lifters in their sockets.
5. *One at a time* remove the lifter from the guide, wash the parts, and replace with a few drops of oil. Do not have any two lifters out of the guides at the same time.
6. Replace lifters and guides in the motor in proper position.
7. After the cylinder head has been replaced, drop the push rods into the lifters, assembling any loose parts, such as the Buick spring sets.
8. Replace push rod lock plates, if any.

Questions:

1. Why should the push rods be taken out and replaced while the cylinder head is in place?
2. Why number lifter guides when they do not move in the motor?
3. What care should be taken in tapping on lifter guides? Why?

Text reference: ....

Assignment Sheet No. 26 — Replacing L-Head Motor Valves and Lifter Clusters

Why this is done: After valves and lifters have been removed for cleaning and reconditioning, it is necessary that they be replaced in the motor in the same place and position that they were in before.
Procedure:

1. Check lifter clusters for numbering and bolt them in place, cluster No. 1 nearest the crank end of the motor. Be sure the right side is out.
2. Connect any oil line fittings that may be attached to the clusters, being careful to use only an end wrench of the proper size.
3. Replace the valve springs, being sure the top end (if any) is up, and then replace washers. Usually this can be done by hand, starting the top of the valve spring up on the guide and compressing it enough to drop over the lifter. Replace the washers with a valve spring lifter.

NOTE: This work is much easier if care is taken to see that each lifter is down off its cam when that spring is being inserted.

4. Drop a valve into its proper seat and compress the spring with a valve spring lifter, guiding the valve stem through the washer and holding it down in its seat.
5. Insert the valve key and carefully remove the lifter tool.
6. Check to see that the key is properly seated in its slot.
7. Repeat for the rest of the valves.

Questions:

1. What would be the result of putting clusters on with the wrong side out?
2. What would be likely to happen if the bottom jaws of the valve spring lifter were too far apart?
3. What would be likely to happen if the lifter tool were jerked out quickly after the key had been put in place?

Text reference: ....

Assignment Sheet No. 27 — Replacing Overhead Motor Valves

Why this is done: After valves have been reconditioned, it is necessary that they be replaced in the proper position and keyed in for motor operation.
Procedure:

1. Place the cylinder head on edge on the bench.
2. Insert a valve in its proper guide, checking the valve number and making sure you are counting from the *front* of the head.
3. Using the same adjustment methods on the compressing tool and exercising all the precautions outlined in Assignment Sheet No. 19, place valve spring and washer on the stem, compress the washer and spring, and insert the key.
4. Release the compressing tool slowly and carefully, and see that the key seats properly in its slot.

5. Repeat for the rest of the valves.

Questions:

1. What would happen if the compressor was not in the center of the valve head?
2. How can you tell which end of the head you should select for No. 1 valve?
3. Why release the spring pressure slowly?

Text reference: ....

Assignment Sheet No. 28 — Adjusting L-Head Motor Valve Clearance

Why this is done: Due to increased length of valve stem caused by expansion under operating heat, a certain amount of clearance must be left between valve lifter and valve stem. This amount is rather exact, as too little will cause expansion to keep the valve lifted off its seat, while too much clearance will not permit the valves to be lifted far enough off their seat.

Procedure:

1. Select three valve tappet wrenches, and thickness gauges, or hack-saw blade, of the proper size and type.
2. Turn the motor over to a point about a half turn after valve No. 1 closes.
3. Test clearance of this valve to determine correction needed.
4. Set wrench on tappet shank, and loosen lock nut just enough to permit adjusting screw to be turned stiffly with a third wrench.
5. Turn adjusting screw up to decrease clearance, or down to increase clearance, until proper size gauge will just slip through the gap.

NOTE: Too much clearance can be avoided by adjusting until the first oversize gauge will not slip through. If using hack-saw blade, it should slip through the gap, but should not wobble loosely.

6. Check clearance and adjust until proper amount is secured.
7. Tighten lock nut and recheck clearance, readjusting if necessary.
8. Repeat these steps for each valve in turn.

Questions:

1. Why turn the motor to a position just past valve closing before adjusting clearance?
2. Why recheck clearance after tightening lock nut?
3. Why do the amounts for valve clearance on different motor specifications vary?

Text reference: ....

Assignment Sheet No. 29 — Adjusting Overhead Motor Valve Clearance

Why this is done: Like L-head motors, overhead valves must have clearance to overcome expansion under heat, but the method of obtaining this clearance differs somewhat.

Procedure:

1. Select a screw driver, box wrench, and thickness gauges, or hack-saw blade, of proper sizes.
2. Test clearance of valve between stem and rocker arm end to determine adjustment needed.
3. Loosen lock nut with wrench and turn screw up with screw driver to increase clearance, or down to decrease clearance, until proper size gauge will just slip through opening.

NOTE: Too much clearance can be avoided by adjusting until the first oversize gauge will not slip through. If using hack-saw blade, it should slip through the gap, but should not wobble loosely.

4. Tighten lock nut and recheck clearance.
5. Repeat the foregoing steps for the rest of the valves.

NOTE: Omission of head gasket, or omission of washers under some rocker arm supports such as Nash, will prevent proper adjustment.

Questions:

1. What would result from too much clearance?
2. Why cannot valves be set without clearance; thus eliminating all noise of operation?
3. Why recheck clearance after tightening lock nut?

Text reference: ....

Assignment Sheet No. 30 — Removing and Replacing Oil Pan

Why this is done: For any work on the lower engine parts it is necessary to remove the oil pan so that those parts can be reached.

Procedure:

1. Check oil gauge and drain any oil in crankcase, replacing plug.
2. Examine the motor to determine if there is anything that would prevent removal of the oil pan itself, and remove any such obstruction, being careful of any gasket.
3. Remove all pan bolts except one on each side, using a speed wrench.
4. Secure help in supporting pan and then remove the last two bolts and lower pan.

CAUTION: Care should be taken to avoid breaking or tearing pan gasket.

5. Examine gasket to determine whether it can be used again.

NOTE: Best practice calls for new gaskets to insure against oil leaks, but to save money gaskets can sometimes be used again if they are not broken or compressed too tightly.

6. If gasket is to be re-used, wash it carefully with gasoline.
7. If gasket is loose from pan, hang it up.
8. Wash pan with kerosene inside and out. It must be *clean.*
9. Spread gasket shellac on edge of pan and lay gasket in place. Drop pan bolts upside down through gasket and pan rim to insure correct bolt-hole alignment and press gasket down until it sticks. Set pan aside overnight for shellac to set.
10. Scrape and wipe clean the lower edge of the block where the pan gasket fits.

NOTE: *Always* have foremen check and O.K. motor before replacing any oil pan.

11. Drop a pan bolt upside down in the speed wrench and while someone holds the pan in place, start the bolt in one side. Start a second bolt in the other side to support the pan and then start all bolts, keeping the gasket in place.

CAUTION: When inserting a number of bolts, never tighten any one bolt until all have been started, thus assuring proper pan and gasket alignment.

12. Draw the bolts down a little at a time, first one and then another, so that one bolt is tightened down while others are still quite loose.
13. Replace any rear plate and gasket that was removed.

Questions:

1. Give two advantages of using a speed wrench to remove an oil pan.
2. Why not take all the bolts out of one side of the pan and then the other?
3. What would result from pan bolts being drawn too tight?

Text reference: ....

Assignment Sheet No. 31 — Removing Piston Assemblies

Why this is done: In order to clean piston and rings, and to replace work parts, it is necessary to remove piston assemblies from the motor.

Procedure:

1. Examine the rod bearing caps, rods, and pistons to be sure they are all numbered both as to cylinder and on camshaft side.
2. Remove the rod bolts and cap from one piston, taking care not to bend any shims.
3. With rod cap as a gauge, determine whether the piston and rod will be able to come up through the cylinder, or will have to go down past the crankshaft.

NOTE: If the piston has to go down, always take it down on the side opposite the camshaft.

4. Remove one piston and rod, and *immediately rebolt* loosely the *cap* and any shims *on the rod.*
5. Repeat for the rest of the pistons *one at a time.*

Questions:

1. What should be done with a set of piston assemblies where only the rod cap is numbered while the rod and piston are not?
2. Under what circumstances could the piston and rod come up through the cylinder when the cap would not?
3. Why rebolt the rod cap and shims on the rod before removing another piston?

Text reference: ....

Assignment Sheet No. 32 — Cleaning and Replacing Rings

Why this is done: The effective operation of a piston ring depends in a large measure on its ability to revolve around the piston in its groove. Accumulation of carbon in the grooves prevents this free ring movement, and must be cleaned out from time to time.

Procedure:

1. Place piston rod in the vise with the jaws holding the edges of the rod channel, and the piston skirt down against the top of the vise jaws.
2. Pry the top ring just out of its groove

with three smoothed-off hack-saw blades, equally spaced around under the ring, and slip it up and off the piston.

3. Repeat for the other rings, keeping each ring stacked on the bench in its proper order and position.

CAUTION: In handling rings it should be remembered that their motion in the cylinder serves to whet their corners to a keen sharp edge, which will cut fingers easily.

4. Grind the end of part of a broken ring to just fit the width of the ring grooves, with a square and chisel point.

5. With this broken ring, clean out all carbon from grooves.

6. Wash the piston assembly in kerosene and wipe off.

7. Replace the piston rings with the hack-saw blades, in the same order and position in which they were before removing.

Questions:

1. Why not take off rings by spreading them with your fingers and pulling them off?

2. Why is it important to keep the same side of a ring up when replacing it?

3. What are the two different kinds of rings. State the duty or function of each.

Text reference: ....

(To be continued)

ELECTRICAL INSTALLATION AND PRACTICE – AN INSTRUCTION SHEET

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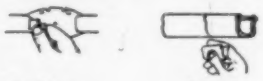
Wiremold

Object: To teach the use of *Wiremold* raceway, and fittings, and to provide practice in *Wiremold* construction.

Information: Wiremold is a trade name for a specific make of metal raceway, manufactured by the American Wiremold Company, Hartford, Conn. Wiremold, while substantially made in two pieces, is not separable except the fittings, the caps of which may be removed.

Wiremold is made in several sizes: No. 500, 700, etc. It is finished in buff enamel and harmonizes with most color schemes, or it may be repainted if desired. Standard lengths are 10 ft. Standard package contains 10 lengths.



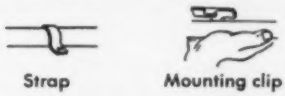
Bushing Coupling

To cut wiremold, hold securely, preferably in a vise, and use a fine tooth hack saw. Remove any burrs with a fine file.

Use a bushing where the end of the wiremold connects to a fitting.

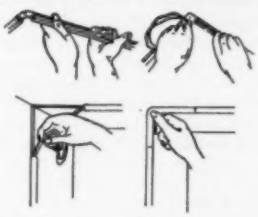
Use a coupling, and snap on a connection cover where the ends butt, when connecting two pieces of wiremold together.

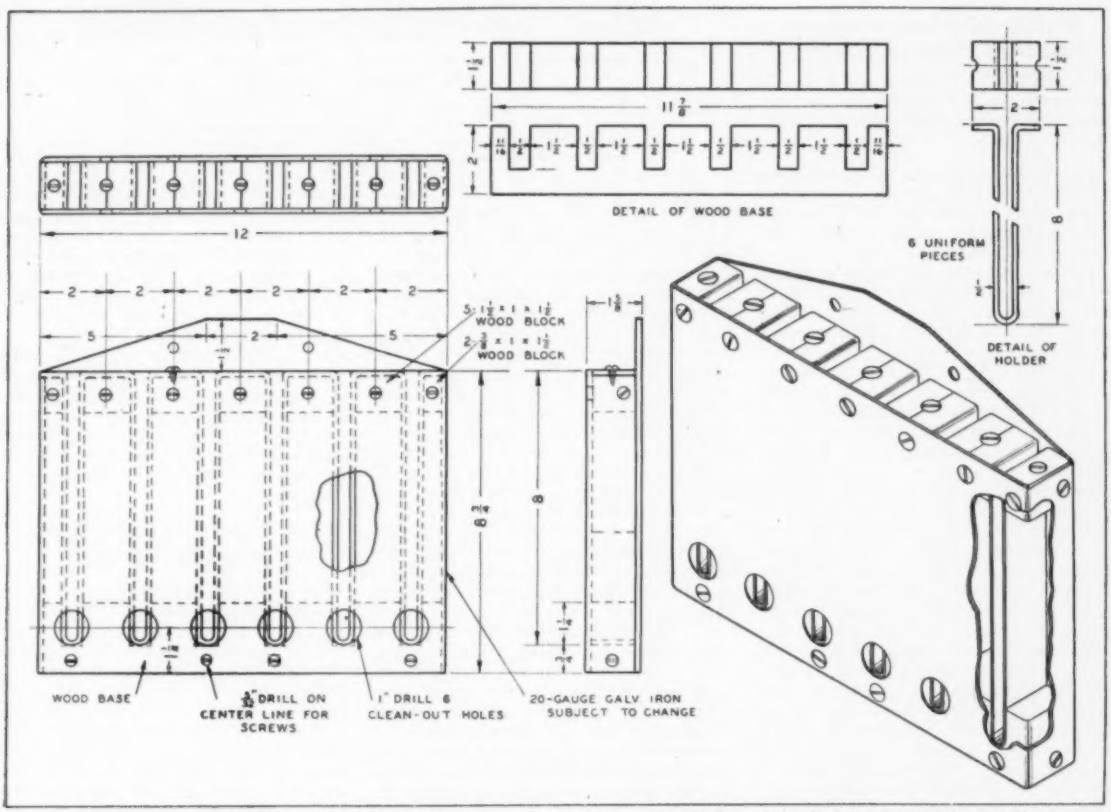
To fasten wiremold to a wall or ceiling use either a strap or a mounting clip.



Strap Mounting clip

Wiremold may only be used for surface wiring in dry locations, where the voltage is not over 300. It must not be used in dumb-waiter





Self-cleaning, sturdy file rack. Designed by Harry F. Mergler, West Technical High School, Cleveland, Ohio

shafts, elevator shafts, or other hoistways. See *Code* regulations for surface metal raceways.

Wires may be drawn into the raceway either before or after it is secured in place. The sketches show how this is done, using fittings as *pull boxes*.

For good specimens of wiremold applications, see the *Wiremold* catalog.

Job: Construct and wire up completely, a Wiremold raceway job, details of which are to be obtained from the instructor. The switch is to control both a drop light and a fixed lamp.

To conserve material in the school shop, use wiremold that is cut in 6-in. or 1-ft. lengths.

Caution: Do not remove any additional *twist outs* from fittings.

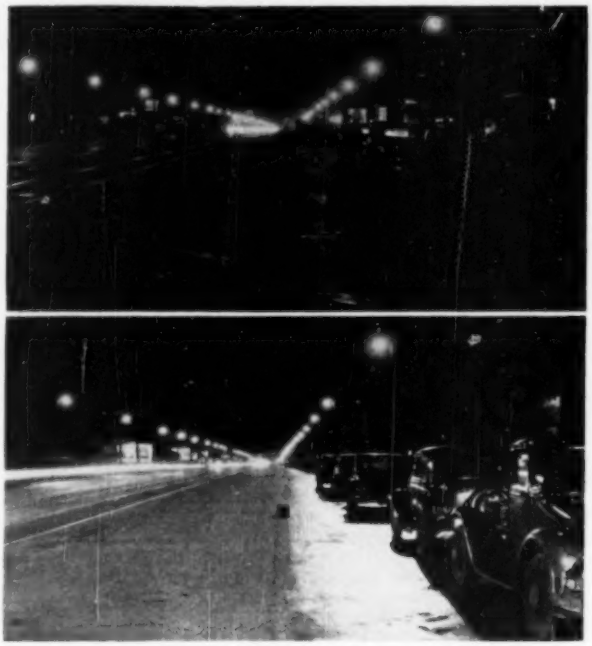
Questions: Give a complete list (exclusive of fixtures) of quantity and kind of fittings and material required to do the wiremold job. List material against figures given on the sketch. There should be two additional items for which numbers are not shown. It is also to be assumed that the wiremold work is to be fed from the switch box alongside the doorway. Only the box with the circuit in it exists at the time of making the estimate.

Reference: Wiremold Catalog.

BETTER LIGHTING REDUCES NIGHT TRAFFIC ACCIDENTS

Ed C. POWERS

Director, Office of Informational Service
Street and Traffic Safety Lighting Bureau
Cleveland, Ohio



How to banish a death trap is shown in this 1¾-mile stretch of Grandview Avenue in Detroit. There were 4 night traffic fatalities in less than a year before (top photo) improved street lighting was installed. During the year following the modernization (bottom photo) there were no night traffic fatalities. The city accomplished this simply by increasing the mounting height of street lights from 18 to 22 ft., and using a modern reflector-type luminaire but with no increase in the power or number of lamps

The active co-operation of the nation's educators in helping to make the American people *safety conscious* is one of the few encouraging elements in the otherwise grim story of traffic killing and injury.

Because instructors are trained to reason, analyze, and to teach, they are particularly well qualified to drive home the facts of modern life to a frequently indifferent American public.

Being factual by profession, educators have been making a thorough study of the traffic accident situation, and one finding which has especially impressed many of them is that highway deaths are often not even associated with traffic volume.

For example, a tabulation of state accident reports has shown that 60 per cent of all fatal traffic accidents occur during the hours of darkness when there is only about one quarter of the day's total traffic on the roads. Furthermore, investigations by the Street and Traffic Safety Lighting Bureau have disclosed that more than half of the night traffic fatalities are caused by unsafe and wholly inadequate street and highway lighting. The problem reduces itself to the simple fact that motorists and pedestrians are not able to see the fatal hazard in the dark or if they do, it is generally too late to do anything about it. Thus, the full force of a speeding vehicle exerts its smashing impact with the usual fatal result.

Investigations into the causes of thousands of night traffic fatalities indicate that upwards of 10,000 lives could be saved each year if street and highway lighting conditions were brought up to date. It is significant that in progressive communities where enlightened civic action has brought about modernization of lighting conditions, night traffic fatalities have been either altogether eliminated or impressively reduced.

Based on scores of experiences throughout the entire country, it can be asserted that action to modernize street and highway lighting to a point of safety is simply not self-starting.

As a rule, nothing is done until responsible people are unwilling to tolerate a continuance of the dangers which breed unobserved in the darkness. For this reason, teachers and civic-conscious groups are asked to co-operate with newspapers and police officials in exposing the whole, uncensored story of the perils that rule our streets at night.

To encourage these manifestations of public interest, governmental officials in many areas have undertaken studies of the problem as it exists in their own communities. They have been surveying the experiences which their citizens have been forced to undergo by reason of unsafe and inadequate street lighting and from this information they are able to chart *danger areas* so that immediate corrective action may be applied to those zones.

Continuing these studies after the modernization of the lighting facilities has shown in virtually all cases to date, that the results have justified an extension of the improvement program. The success in many cities has brought about the development of city-wide street lighting modernization which will provide maximum dark-hour safety to all people who live in those cities.

Because it has been proved so effective in routing the terrors which prowl our streets and highways, safe and adequate roadway lighting will continue to receive the active support of unselfish civic groups. Modern educators, always alert to the needs of the times, have been quick to join the crusade.

A PAINT THAT IS LIKE A STORAGE BATTERY

The paints with which most of us are familiar, reflect light, and the color of the paint is determined by the portion of the light spectrum that the paint reflects. Paints that *emit* light — that is, glow in the dark — are relative newcomers. These absorb light somewhat like a storage battery, and then expend it in the dark. They are called "luminous" paints and are used to paint wall switchplates, stairs and banisters, clock dials, fish lures and floats, telephones, toilet seats, and other points so that these can be found quickly in total darkness. — *The New Jersey Zinc Co.*

STARTING A HOME WORKSHOP

JOSEPH J. LITTRELL
Instructor of Industrial Arts
High School
Wahoo, Neb.

Most industrial-arts instructors try to give a certain amount of consumer knowledge somewhere in their course content. There are various ways in which this can be accomplished. In our school shop a particular type of consumer knowledge was given in relation to hand tools. It was injected into the regular course content when an appropriate time seemed to present itself.

We use the wall cabinet tool storage method, and it was felt that many boys probably did not realize the expense of tools and the need for care to be given to the various tools.

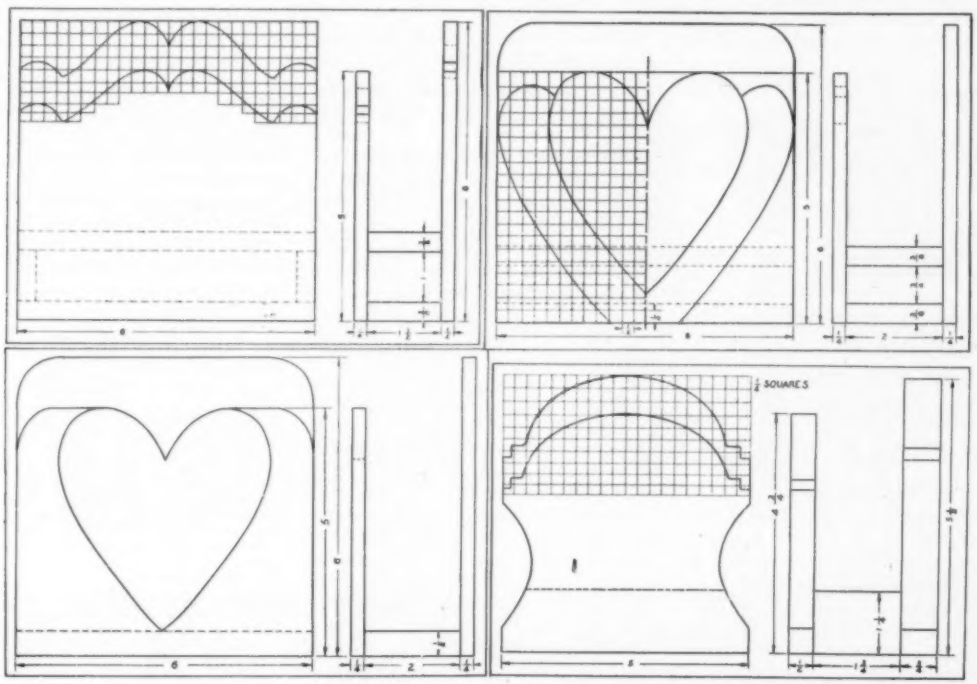
Instruction in the use and care of tools had been given, but of course all tools had not been used in ordinary project procedure. Therefore the preparatory step was to make sure every pupil understood a little about all the tools in the school shop. This was done by asking the students to obtain from the tool cabinet a tool called for by the instructor. When the tool was displayed the class determined the size description of it, the approximate cost, and nature of its quality. Each tool was thus displayed, and the boys were asked to list these with the information that had been discussed.

The assignment given was of a different nature than what the boys had expected. It was assumed that the boys would own a certain amount of tools someday and they were asked to imagine themselves starting to build a home workshop of their own. They were to start with no tools and were allowed no more than $25 for their first purchases. It was agreed that a bench need not be included in the list as the shop owner would make it later himself. Now the objective of this, from the boys' standpoint, was to buy only the basic tools first. The tools must be of a good quality; students were advised to stay clear of any inferior tools. Students were encouraged to consult the local hardware stores, catalogs, carpenters, farmers, and any persons owning home shop equipment. Through class discussion various points were listed to check in the purchase of new tools. This list was as follows:

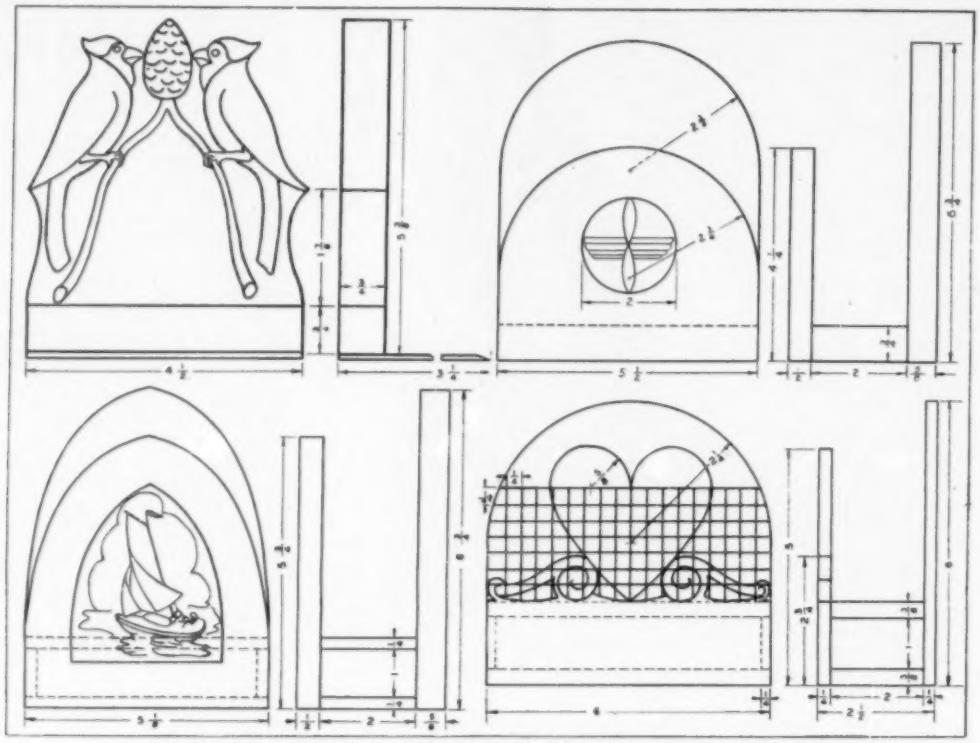
1. Tools used most frequently
2. Size description of each
3. Purchase good quality equipment
4. Cost of each tool
5. Consideration of tools of a special nature and those that might need extra materials to make them usable, i.e., soldering copper, requiring a blowtorch or some method of heating (such as gas or electricity), solder, flux, and sal ammoniac
6. Nature of the work the tool is expected to do
7. Availability of the tool

As most people rarely buy many of these items at a time, but usually pick up tools as the need or opportunity arises, it was felt that $25 was sufficient for the first purchases. The results were most satisfactory. The boys consulted the various sources and came back with information that was of much value in the way of quality, description, and costs of tools found in our locality. Boys from the rural area usually presented a list of tools that differed from those listed by the students from the town area. The prices varied from catalogs and from store to store. Discussion was held on the merits of the quality in the different tools until one, or possibly two or three makes were to be regarded as being the best purchase to make. The tools selected to be purchased first for a home shop were as follows:

1 saw, crosscut 8 point — 26 in.
1 plane, smoothing
1 pliers, adjustable 8 in.
1 wrench, adjustable, open end 10 in.
1 screw driver, 6 in.
1 file, flat mill, bastard cut, 10 in.
1 rule, 2 ft. or steel tape 6 ft.
1 hammer, claw 16 oz.
1 brace and 3 auger bits, ¼, 3/8, and ½ in.
1 square, carpenters, 16 by 24-in.
1 vise, machinist, 4-in. jaw
2 chisels, bench, ¼ and ½ in.
1 chisel, cold ½ in.
1 hacksaw, 10-in.
1 dozen hack saw blades, 24 teeth per in.



Simple book ends. Submitted by H. D. Schultz, industrial-arts department, Berea College, Berea, Ky. **(Continued on next page)**



Simple book ends. Submitted by H. D. Schultz, industrial-arts department, Berea College, Berea, Ky.

The objectives this assignment helped to achieve are:

1. To develop a greater interest for home workshop.
2. To develop a respect for the school shop tools.
3. To develop co-operation and self-discipline.
4. To develop a knowledge about buying, using, and caring for tools.

METHODS OF TEACHING OCCUPATIONAL SUBJECTS

C. A. FELKER
Department of Vocational Education
Toledo, Ohio

(Continued from page 365 of the November, 1948, issue)

The Application Step

The third step in the 4-step lesson is the *application step*. It is the step in which each student performs the operation of plain drilling flat work (series of holes same size). Now, owing to the fact that most machine shops in the all-day trade programs have no more than one vertical drill press, this step, *for all members of the class*, cannot immediately follow the presentation step. If there were twenty drill presses in the school shop and twenty students in the class, then, the application step for every student could immediately follow the presentation step. This presents a real problem for the shop instructor, which is taken care of by the use of operation sheets.

If the shop instructor has twenty students in the class, he puts on the preparation and presentation steps to as many of the twenty as he can assign to the drill press within a reasonable time after the presentation step. It would be foolish to have a student in the group who could not perform the operation by himself for several weeks after the presentation. It would not be reasonable to expect him to remember all he saw and heard at the time of the presentation. The instructor then gives one student an operation sheet involving the operation — plain drilling flat work (series of holes same size). This student performs the operation, following the operation sheet which is the student's blueprint.

The following is the operation sheet on this lesson. The title is obtained from column one of the job analysis. The tools, supplies, and equipment are obtained from column four, and the procedure from columns two and three. The procedure contains simple directions for doing the operation and combines the items in columns two and three. It will be noted, however, that each step in the procedure is expanded somewhat from the operation steps and information points. This is done because the student uses the operation sheet, and the procedure steps cannot be too concise or he might become confused.

OPERATION SHEET

Block IX Vertical Drill Press — *Unit E*
How to Plain Drill a Series of Holes (Same Size) in a Flat Plate

Tools — Supplies — Equipment:

Vertical drill press	Clamps
Taper shank drill	Bolts
Oilcan — coolant	Flat plate laid out
Bench brush	Wrenches
Small gauge	Shims
Center punch	Hammer

Remove rings and necktie — roll up flowing sleeves.

Procedure Steps:

1. Clamp work securely on parallels.
2. Check layout and center punch all layout centers.
3. Check size of drill. Insert drill and fasten securely.
4. Set proper speed and feed. See *American Machinists' Handbook*, Sixth Edition, pages 118–126.

(Continued on page 12A)

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ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

(Continued from page 40)

5. Unlock table and pull so that point of drill is in approximate alignment with one layout center.

6. Start machine.

7. Advance drill by hand and take a trial cut deep enough to see if the drill is on center with the hole.

8. If drill is not centered, pull table over until drill is centered. Re-center-punch the hole.

9. Lock table and lock feed.

10. Drill through the work. Do not allow the drill to go too far beyond the hole.

11. Repeat steps 5, 7, 8, 9, 10, for the remaining holes.

Questions:

1. Why is it poor practice to use excessive speeds in drilling these holes?

2. Why is the center, re-center-punched after the trial cut if the drill is off center?

When the instructor gives a student this operation sheet and requests him to perform this operation — plain drilling flat work (series of holes same size), the latter is then in the application step of the 4-step lesson. The remaining members of the group will perform the operation as conditions warrant, but, at any rate, it will take some time before every member can perform the application step. We must agree that the operation sheet is indispensable, especially to those students who cannot perform the operation immediately after the presentation step.

At this point we ask what the instructor does during the application step. Does he help the student, especially if the student runs into difficulty or performs incorrectly, or does he require the student to perform the operation on his own? Perhaps we can answer this question by listing the following responsibilities of the shop instructor during the application step.

1. *Supervises the student's performance.*
2. *Asks questions to straighten out the student if he runs into difficulty.*
3. *Checks on the effectiveness of the teaching.*
4. *Re-teaches if necessary.*

The instructor does not spend all his time with one student who is performing the operation — plain drilling flat work. The remaining students are not standing idle. They are to be assigned to other tasks which also require supervision.

After each student has performed the operation, the application step is completed and the test step of the 4-step lesson follows.

(To be continued)

Personal News

♦ Professor A. P. Twogood of the Engineering Extension Department, Iowa State College, Ames, Iowa, conducted a workshop on the "Technique of Teaching Trades," during the summer school session at the Kansas State Teachers College, Pittsburg, Kans.

♦ Charles Andrews, formerly of Albia, Iowa, is now teaching industrial arts at Independence, Iowa.

♦ Clifford Schumacher, woodshop teacher at the Greusel Intermediate School, Detroit, Mich., died suddenly during the summer.

He is survived by his wife and three children.

♦ Orlo R. Dickerson died during the summer. He suffered from a heart ailment for several years. He had retired in spring after having been department head at the Tappan School, Detroit, Mich., since its opening in 1929.

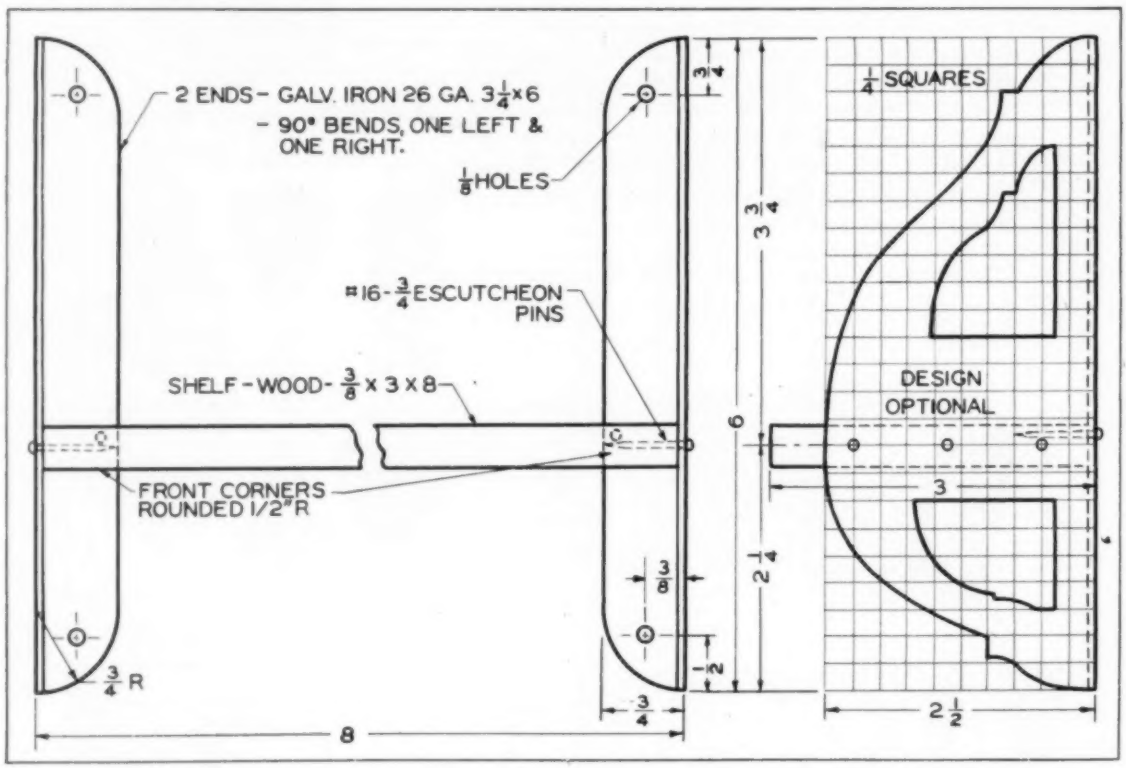
♦ Ray Glynn is teaching drawing in Marshalltown, Iowa.

♦ Vincent Kliegl has been appointed to a teaching position in the public schools in Vail, Iowa.

♦ Herman S. Arrasmith has been appointed to the teaching staff of the high school at Davenport, Iowa.

♦ Robert F. Woychick has been appointed instructor of industrial arts at the University of North Dakota, Grank Forks, N. Dak.

(Continued on page 16A)



Wood and metal shelf. Submitted by Harry S. Baldwin, General Mercer School, Toronto, Ont., Can.

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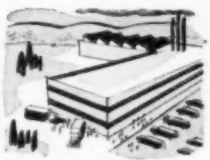

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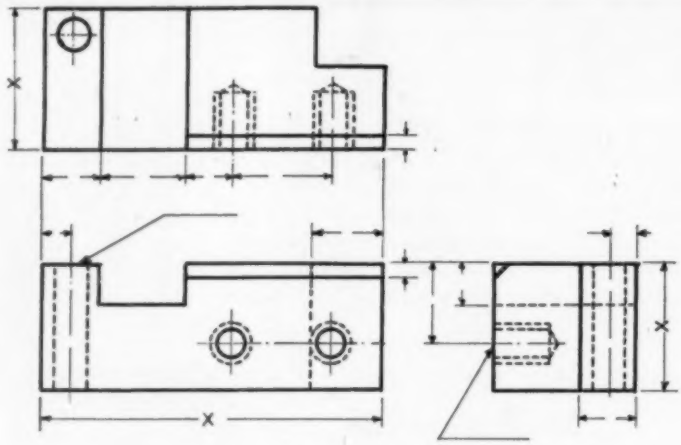


FIG. 1
INCORRECTLY DIMENSIONED

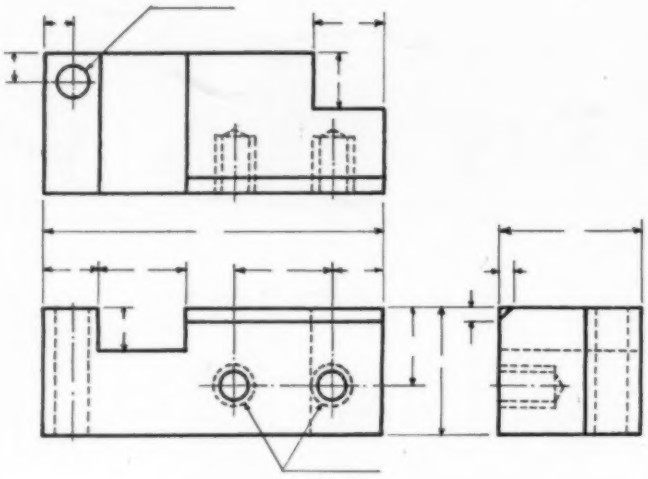
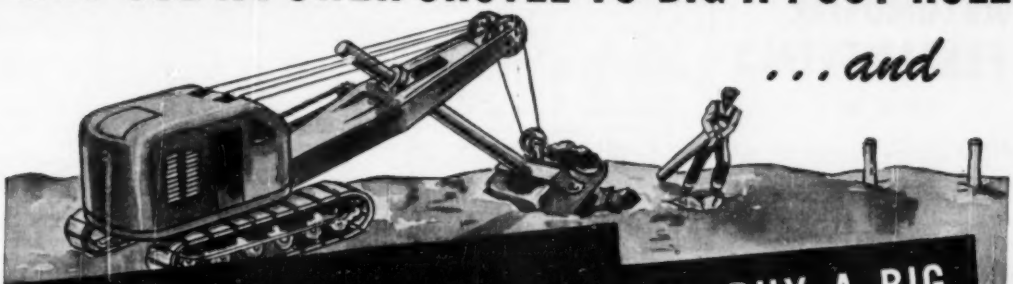


FIG. 2
CORRECTLY DIMENSIONED

ALL DIMENSIONS MUST BE PLACED ON THE ASSOCIATED OUTLINE VIEW. THUS, IN FIG. 1, ALL DIMENSIONS EXCEPT THOSE MARKED X ARE INCORRECTLY PLACED BECAUSE THIS RULE IS VIOLATED. FOR EXAMPLE, THE DRILLED HOLE IS SPECIFIED IN THE FRONT VIEW. IF WE HAD ONLY THIS VIEW, THE DOTTED LINES MIGHT REPRESENT A ROUND, SQUARE OR EVEN A CUT OF SOME KIND ON THE FAR END OF THE BLOCK. THE TOP VIEW SHOWS NOT ONLY ITS CHARACTER, BUT LOCATION AS WELL. SO ALL THE DIMENSIONS PERTINENT TO THE HOLE SHOULD APPEAR ON THE TOP VIEW. THE SAME IS TRUE OF THE OTHER DIMENSIONS EXCEPT THOSE MARKED X, WHICH ARE INCORRECT BECAUSE OVER-ALL DIMENSIONS SHOULD BE PLACED BETWEEN VIEWS.

A lesson sheet on dimensioning. Submitted by K. H. Czirr, High School, Closter, N. J.

WHY USE A POWER SHOVEL TO DIG A POST HOLE



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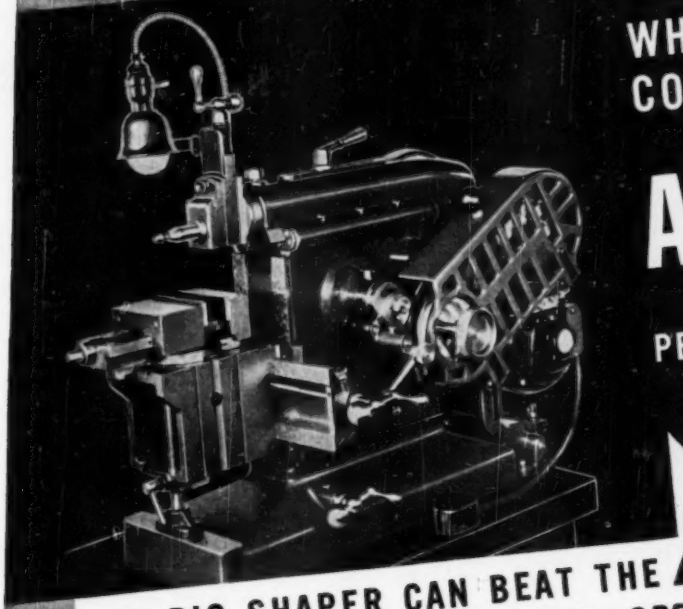

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Assistant Manager, Service Department, Ford Motor Company. Technical Writer and Editor of Service Publications. Organizer and Administrator of Dealer Service Training.

and

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(Continued from page 12A)

♦ ALVIE SARCHETT has been made head of the industrial-education program in the city schools of Mason City, Iowa.

♦ MARSHALL REYNOLDS, formerly teacher of industrial arts at the high school in Bloomfield, Iowa, has been appointed head of the industrial-arts program in Perry, Iowa.

♦ PAUL GARRISON is teaching drawing at the Technical High School, Des Moines, Iowa.

♦ DONALD AMELON, a graduate of the University of Missouri, is in charge of the newly organized general shop at Webster Groves, Mo.

♦ OTTO J. HEJKAL has been granted a leave of absence from his position in the department of industrial arts at Memphis State Teachers College, Memphis, Tenn., and is now in attendance at the University of Missouri where he is working toward his doctor's degree in industrial education.

♦ L. R. GUILDAUME has retired after 35 years of service in vocational agricultural education in Bradford County, Pa. A testimonial dinner was tendered him on May 12, 1948.

♦ CLAUDE A. BELL of Monroe received his master's degree in industrial education from the University of Missouri in August, and is now instructor of industrial arts in the public schools of Charlotte, N. C.

♦ PAUL EVANS resigned his job as training officer with the Veterans Administration and is now teaching part time in the Engineering College of the University of Missouri and pursuing graduate study in industrial education.

♦ FORREST WHITWORTH received his master's degree in industrial education from the University of Missouri in August, and has returned to his position as head of the department of industrial arts at the Maplewood-Richmond Heights High School, Maplewood, Mo.

♦ MERTON C. WHEELER, Missouri's state supervisor of industrial arts, received his master's degree from the University of Missouri in August, and is now engaged in an active program of promoting industrial arts in the public schools of Missouri.

♦ JOHN W. KARNES, JR., on leave from his position as instructor of industrial education, North Texas State College, Denton, is now teaching part time in the University of Missouri, and working toward his doctor's degree in industrial education.

♦ CYRIL HALL is teaching mechanical drawing at the High School, Peru, Ind.

♦ RUDOLPH HILTON has been appointed coach, and instructor of industrial arts in New Goshen, Ind.

♦ CLAYTON HUGHEY has been named instructor of industrial arts at Jasper, Ind.

♦ HERBERT R. GALBRAITH is teaching mechanical drawing at Logansport, Ind.

♦ WILLIAM C. FOREMAN has been appointed instructor of industrial arts at Russellville, Ind. He also has charge of physical education.

♦ THOMAS YEAGER is in the woodshop courses at the High School at Peru, Ind.

♦ ORVILLE NORTHAM, formerly instructor of printing at the New Mexico Teachers College, Portales, N. Mex., has been appointed instructor of printing at the senior high school, Tucson, Ariz.

♦ C. E. HIGHLAN, formerly principal of the Technical High School in Atlantic City, N. J., has joined the staff of trade and industrial education at Purdue University, Lafayette, Ind. He has been named head of the T. and I. education division.

♦ KITOKU ISHIGURO of Kalaheo, Kauai, Hawaii, received his master's degree in industrial education at the University of Missouri in June, and is now teaching industrial arts at the high school of Hilo, Hawaii.

♦ WRAY D. SILVEY has resigned as co-ordinator at Eldon, Mo., and is now employed as a research assistant in the department of industrial education at the University of Missouri where he is also a part-time graduate student working toward his doctor's degree.

Association News

♦ The 35th meeting of the Industrial Arts Conference was held in Chicago, Ill., on November 11–13, 1948.

The subject for discussion on Thursday morning, November 11, was "Industrial Arts in General Education."

Dr. Verne C. Fryklund, the general chairman, opened the session and then turned it over to Dr. Fred Schmidt, Jr., who with Otto C. Olson and R. M. Torgerson, presented the subject for the consideration of the members of the conference, and the visitors who were in attendance.

C. H. Groneman was the chairman at the Thursday afternoon session. He and C. Kenneth Beach and Dewey Barich presented the subject "Industrial Arts and the 60 Per Cent."

A lively discussion followed.

The session on Friday morning was under the chairmanship of Dr. William T. Bawden. The title, "Comparative Industrial Education," lent itself very well to the interesting reports which Dr. Homer J. Smith and Dr. Verne C. Fryklund gave of their three-month stay in Germany and Japan respectively.

Dr. L. V. Newkirk was the chairman of the Friday afternoon session, and he and Dr. Fred Strickler and W. A. Klehm presented the theme, "Problems of Industrial Arts in the Elementary School." The subject served as the basis for quite a thorough discussion.

On Saturday morning, the discussion part of the session was under the chairmanship of Melvin Lewis. He and Dr. Harold Silvius and Professor A. B. Mays presented the subject "Graduate Programs and Problems in Industrial Education."

The business session was held under the chairmanship of the general chairman, Dr. Verne C. Fryklund.

♦ The Wisconsin Industrial Arts Association held its annual meeting on November 4, 1948, at Milwaukee, Wis. William A. Sherman of Eau Claire, Wis., president of the association, was chairman.

C. A. Bejina, of the General Electric Company, gave a very interesting demonstration and explanatory talk on "The What and How of Television."

A special broadcast by WTMJ followed.

R. A. Charette, Milwaukee, Wis., was elected president for the coming year. H. J. Shufelt, Racine, Wis., is the secretary of the organization.

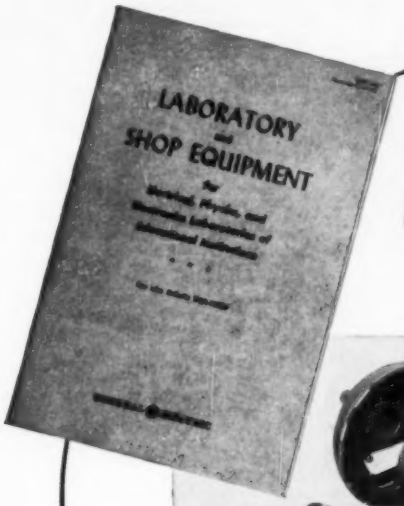
Sectional meetings on general metal, mechanical drawing, machine shop, printing, and woodworking, was held on Friday afternoon.

♦ The alumni officers for The Stout Institute Alumni Association for the years 1947–49 are: Miss Nellie Schoonover, national president, Milwaukee, Wis.; Carl Froelich, national first vice-president, West Allis, Wis.; Elmer Clausen, national second vice-president, Menomonie, Wis.; Fred Decker, N.E. area vice-president, Detroit, Mich.; Mrs. Lillian Baxter Wischan, S.E. area vice-president, Stratford, Conn.; Miss Margaret Gibson, Midwest area vice-president, Menomonie, Wis.; Mrs. Vivian Bow Vallee, Westcoast vice-president, Westwood Hill, Los Angeles, Calif.; W. R. Baker, national secretary, The Stout Institute, Menomonie, Wis.

♦ The Wisconsin Vocational Association held a luncheon meeting at the Schroeder Hotel, Milwaukee, Wis., on November 4, 1948. C. D. Rejahl, Madison, was chairman. "The National Aspects of the Program of Vocational Education" was the subject of the main address. The arrangements for the coming A.V.A. convention at Milwaukee also were discussed.

♦ Mu Sigma Pi held its annual club night at the Tappan Intermediate School, Detroit, Mich., on the evening of October 8, 1948.

(Continued on page 18A)



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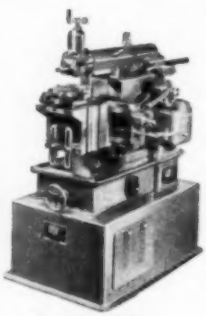

No. 8000 12" SHAPER

(Continued from page 16A)

After a business meeting at which 37 candidates were selected for initiation into Mu Sigma Pi membership, about 100 members and guests sat down to dinner.

The following five men were initiated into Mu Sigma Pi membership: Stanley E. Sweet, machine-shop instructor, High School, Bronson, Mich.; Morgan E. Wilcos, who had taught general shop in the Georgia schools, and who now is resident on the Wayne campus, completing his master's degree work; Horace J. Charles, industrial-arts teacher in Akron, N. Y.; Ronald B. Thomas, industrial-education teacher in Charleston, W. Va.; Ralph G. Williams, trade and industrial teacher from Brandenton, Fla.

News Notes

♦ *Welding Helps for Farmers*, published by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio. Cover, flexible board covered with parchment cloth simulating leather, gold embossed; 448 pp., 5¾ by 8⅝ in., illus.; price, postage prepaid in United States, $1 per copy; elsewhere, $1.50 per copy.

Welding Helps for Farmers is a handy manual for farm owners who seek ways to save time and work. The examples of mental alertness and of mechanical skills contained within the book were written by farmers in every area of the nation. High line electricity and modern welders provided farmers with the means of putting ideas into practical working tools.

The book is divided into 16 sections. The first six sections give general information about the use of welders on farms and also detailed directions for operating an arc welder. The remainder of the book is devoted to the stories told by farmers of tools and equipment they built, along with accounts of how the work was done.

♦ Six thousand boys and girls, who would have had no chance of education, are learning to read and write under the compulsory free basic education scheme introduced in rural areas in Delhi on July 1 of this year.

So far 45 new schools have been opened. The attendance in the schools has doubled. Where one instructor was thought to be enough, at least two are now necessary. More schools are being planned and more teachers, men and women, are being trained.

The basic education experiment in Delhi is intended to serve as a model for other provinces. In the first year, children between six and seven will be given free and compulsory primary education. Later, successive age groups will be sent to schools, so that in 8 years all children between 6 and 14 will get compulsory, free primary education.

♦ A revised bibliography for diversified occupations has been prepared for the State Board of Vocational Education, Oklahoma City, Okla., under the supervision of J. B. Perky, director, and L. V. Ballard, state supervisor.

♦ The American Standards Association became the American Standards Association, Incorporated, August 2, through incorporation under the laws of the state of New York.

It was organized in 1918 as the American Engineering Standards Committee, a co-ordinating committee for the standardization work of five of the country's important technical societies. The scope and organizational setup were soon broadened to include associations and government agencies. This led to the extension of the work into the field of safety standards. In 1928, an entire reorganization took place, changing the committee into a full-fledged "American Standards Association," the nation's clearinghouse for standards and the U. S. medium for international contacts on standardization.

♦ The Highway Public Safety Department, Raleigh, N. C., reports that out of the 5242 school buses now in operation in this state, the largest number in a single state in the United States, 83 per cent of them are driven by students from the ages of 16 to 19. And, according to C. C. Brown, director of the school transportation system, 17 per cent of the school bus drivers who are adults are responsible for 25 per cent of the bus accidents, while the remaining 83 per cent who are students are responsible for only 75 per cent.

On each bus, in addition to the driver, there are two substitute drivers to serve in cases of emergencies.

♦ Budgeting for Security, a new edition of the study unit on money management and budgeting, is being offered to teachers for use either as an independent course of study in budgeting, or to supplement classroom work in arithmetic, mathematics, home economics, social studies, and business education. Single copies are available on request from the Savings Bonds Office in each state or from the Education Section, U. S. Savings Bonds Division, Treasury Department, Washington 25, D. C., free.

♦ The first five winners in the Twelfth Annual IPI Essay Contest are as follows: first prize — Helen McNaughton Spencer, Fayetteville High School, Fayetteville, N. Y.; second prize — Janice Gockel, Evanston Township High School, Evanston, Ill.; third prize — Gennaro Paolillo, Brooklyn H. S. of Automotive Trades, Brooklyn, N. Y.; fourth prize — Richard Vigneault, Laconia High School, Laconia, N. H.; fifth prize — Samuel Green, Salem High School, Salem, N. J.

(Continued on page 19A)

(Continued from page 18A)

Besides these five main prizes there were 25 minor prizes.

The special prize of a silver cup for the essay most handsomely printed in color went to the Mergenthaler Vocational High School of Printing, Baltimore, Md. The author of the essay, Mildred Scott, was presented with a check for $20 and a gold lapel pin. Prizes of $20 for attractively printed essays went to School of Graphic Arts, Montreal, Canada (essay by Isabelle Perault); Purcell High School, Cincinnati, Ohio (essay by Don Hogan); and Portland High School, Portland, Me. (essay by Ronald Reed).

♦ For the thirteenth consecutive year, International Printing Ink will sponsor the annual IPI Essay Contest in co-operation with the National Graphic Arts Education Association. Additional cash and other prizes have been approved for both national winners and printed essay award winners in the 1948–49 contest.

The annual IPI essay contest is strictly an educational activity designed to focus attention on the importance of printing and printing education, particularly in secondary schools. Its aim is to stimulate student interest in the graphic arts and in those related fields which play such a vital part in our lives.

This year the sponsors have chosen "Printing and Free Government" as a most fitting and timely subject. The vital importance of free government to the maintenance of our economic and social freedom is stressed daily in international current events.

The broad subject, "Printing and Free Government," is suggestive of an almost unlimited number of subtopics. Here are 12 suggestions:

How Printing Protects Minorities
Printing's Role in the Fight for Political Freedom
Printing and Free Elections
The Importance of Printing in a Democracy
How Printing Protects the Right to Vote
Printing and the Right of Free Speech
How Printing Promotes Stability in Free Government
The Importance of Printing to Democratic Principles
A Free Press — Bulwark Against Dictatorship
How Printing Fights Dangerous Ideologies
Printing's Part in Training Young Americans
Printing and Justice in Government

This list of subtopics should by no means be considered all inclusive. We repeat that students may write on any phase of the main subject which interests them.

Prizes and awards: The following national prizes are offered:

1st prize — $500, 2nd prize — $250, 3rd prize — $100, 4th prize — $50, 5th prize — $25, 6th to 30th prizes — $5.

In addition to these national prizes, local awards will be made, as in the past, for the best papers submitted at each school. These prizes will be sent in time to be presented in connection with Franklin Week ceremonies.

Other national winners will receive silver lapel pins, and all local winners will receive bronze lapel pins.

For more detailed information, address International Printing Ink, Division of Interchemical Corp., 350 Fifth Ave., New York 1, N. Y.

♦ Fisher Body Craftsman's Guild, General Motors Bldg., Detroit 2, Mich., announces the winners of the 1948 Fisher Body Craftsman's Guild model car competition. The names of the winners follow.

Senior Division (boys 16 through 19): first, Harvey E. Whitman, Jackson, Mich., $4,000; second, Howard Eichen, San Francisco, Calif., $3,000; third, Leon Levan, Washington, D. C., $2,000; fourth, Howard K. Graves, South Bend, Ind., $1,000.

Junior Division (boys 12 through 15): first, Ronald Johnson, Portland, Ore., $4,000; duplicate first, Tom Goad, Birmingham, Mich., $4,000; second, Harold L. Simon, San Antonio, Tex., $3,000; third, Paul E. Jaquish II, Saginaw, Mich., $2,000; fourth, Richard A. Norton, Chicago, Ill., $1,000.

♦ Parts reordering problems have been simplified by a new "Quick Reference Chart of Fast Moving Chassis Parts and Kits," recently distributed by the Ford Motor Company.

Designed to hang on the wall, the chart contains a series of exploded views of Ford car and truck parts assemblies. Each part is marked with its Ford part number to assure proper and easy identification of individual requirements. Orders may easily be placed from the information obtained directly from these exploded views of parts assemblies. The cover of the charts provides a quick index.

♦ Atlanta and Fulton County Schools, Georgia, have joined a select list of 14 systems in the nation owning a full-time educational radio station.

With the dedication September 9 of Radio Station WABE-FM, they became the first system in the Southeast to have such a facility to add to audio-visual education aids.

It was presented to the Atlanta Board of Education by the Rich Foundation of Atlanta. The gift included all station and studio equipment for broadcasting, and 300 FM receiving sets for use in the schools. On the basis of one receiver for each eight teachers, these sets were distributed through the 70 schools of the city system and the 91 units of the county system, for use by a total of 90,000 students in elementary and high schools.

♦ Information concerning career opportunities in the Immigration Service of the U. S., has just been published by Occupational Index, Inc., New York University, New York 3, N. Y. Written by Gloria H. D. Nelom, this new abstract will provide useful facts to vocational counselors, teachers, students, veterans, and others, for 25 cents cash with order.

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Questions and Answers

FINISHED BASSWOOD

1130. Q.: Could you tell me how to stain a basswood chest of drawers so that it will blend with a Priscilla finished maple bed? The chest is already cleaned down to the bare wood. — *H. S. L.*

A.: The method of applying finishes for this type of work is described on pages 122 and 123 of my book, *Wood Finishing and Painting Made Easy.** — *Ralph G. Waring.*

*Published by The Bruce Publishing Company, 540 N. Milwaukee St., Milwaukee 1, Wis.

TEACHING AND SUPERVISING INDUSTRIAL ARTS

1132. Q.: Kindly give me references to articles in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION on techniques of introducing new projects, ideas, etc., into an industrial-arts program. Also on the techniques a supervisor would use in introducing new phases of instruction to his industrial-arts teachers. — *P. G. P.*

A.: The following articles on the techniques of teaching and supervising industrial arts have been published in the past six volumes of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION:

1942

September, p. 282 — Vitalizing Elementary and Secondary Education Through the Practical Arts
October, p. 326 — The Demonstration
November, p. 365 — A Program for Conserving Shop Tools and Equipment
November, p. 369 — Steps in Teaching a Lesson
December, p. 414 — Planning the Daily Lesson

1943

February, p. 57 — 102 Key Words
February, p. 57 — The Positive Approach to Good Control
April, p. 175 — Competition as a Teaching Device in the Machine Shop
May, p. 203 — Writing Objective Tests for Shop Instruction
June, p. 249 — By-Products of Teacher-Built Projects
November, p. 357 — Industrial-Arts Offerings in the Small High School
December, p. 402 — A New Industrial Arts for a New Day

1944

January, p. 16 — Industrial Arts in High School
February, p. 55 — A Reinterpretation of Industrial Arts Objectives
March, p. 107 — The Development of a Program for Industrial Arts
March, p. 129 — Manipulative and Nonmanipulative Time Elements
September, p. 274 — Tool Storage
September, p. 300 — Evaluating the School Shop or Laboratory

1945

January, p. 10 — The Consumer Looks at Industrial Arts
February, p. 73 — Aeronautics in Industrial Arts
March, p. 105 — A Unit Inventory System
March, p. 141 — Industrial Arts Equipment and Supplies for the General Shop
March, p. 72A — Providing for Individual Differences in Shopwork
April, p. 155 — A Remedial Industrial Arts Program for High School
June, p. 242 — New Conceptions of Industrial Arts
September, p. 301 — Check Points
November, p. 405 — The Implications of Industrial Arts for General Education
December, p. 440 — Translating a Philosophy Into Practice
December, p. 471 — A Simple Inventory System for Materials and Supplies

1946

March, p. 103 — Plans for Setting Up Vocational and Industrial Arts Courses
March, p. 109 — An Industrial Arts Expansion Program
April, p. 147 — Industrial Education in the Years Ahead
April, p. 173 — Course of Study for First-Year Industrial Arts Machine Shop
June, p. 235 — Basic Assumptions
June, p. 254 — Grading the Shop Student
September, p. 279 — Needed Emphasis in Industrial Arts
September, p. 290 — Industrial Arts Planning Center
September, p. 309 — Industrial Arts Training Program
October, p. 331 — Industrial Arts in the Modern Senior High School
October, p. 337 — The Comprehensive Industrial Arts Program
October, p. 349 — A Shop Teacher Takes Inventory
November, p. 396 — Industrial Arts in the Elementary Schools
November, p. 397 — How to Put the Home in the Industrial Arts Shop
November, p. 421 — Foreman's Club
December, p. 441 — Evaluation of Student Progress in Industrial Arts

1947

January, p. 14 — Efficient Shop Teaching
February, p. 79 — Justification for Handwork
April, p. 176 — The Assignment, Work Habits, Study Skills
September, p. 285 — State Syllabi in Industrial Arts
September, p. 287 — Industrial Arts Objectives
October, p. 321 — State Syllabi in Industrial Arts
November, p. 364 — Organizing Technical High School Woodworking Courses — J. J. M.

(Continued on page 28A)

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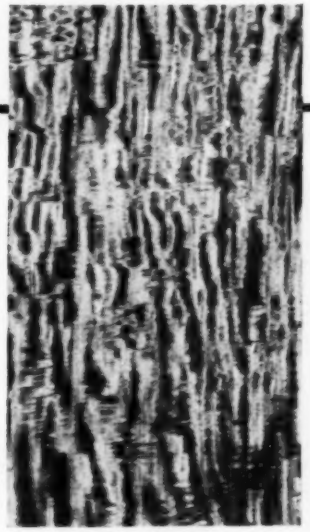

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Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

NEW BOICE-CRANE WET GRINDER

A new wet tool and knife grinder with self-adjusting friction drive has been developed by Boice-Crane Company, 932 Central Ave., Toledo 6, Ohio.

The Friction-Matic grinder has a simplified friction roll drive which eliminates two pulleys and two bearings. There is no countershaft belt to adjust or replace. The 1-in. steel roller is mounted on a ½-in. diameter shaft.

Boice-Crane wet tool and knife grinder

The peripheral speed remains constant as the wheel wears, the Friction-Matic automatically compensating for the step-up in wheel rim speed.

This new grinder is equipped with a controlled water action, which prevents water being thrown on the operator. This makes it possible for him better to control the pressure of the tool against the wheel.

The tool rest, 2½ by 5 in., permits the perfect sharpening of long, slim, carving and slicing knives, the wide blades of long-handled axes and hatchets, and the widest plane bits and scrapers.

The wheel is natural quarried Ohio sandstone, 8 in. in diameter, with a 1½-in. face. It has a speed of 135 r.p.m., which increases as the wheel wears so as to maintain a peripheral speed of 280 feet per minute. Trued on a stainless steel shaft, it has a useful life far in excess of the ordinary.

The wheel shaft and the case are of seamless steel, and the tank, main frame, and tool rest are made of 16-gauge steel, gray enameled. The interior of the tank is finished in baked enamel to render it rust-resistant.

For brief reference use IAVE—0101.

LITTLE GIANT AUTOMATIC CYLINDER PRESS

The Little Giant automatic cylinder printing press, with some 28 new, postwar improvements, is now going to school.

Since it started its scholastic career 18 months ago, it has "enrolled" in some 50 vocational and senior high schools in 22 states. At these schools, the streamlined press has proved to be a fine addition to the printing equipment.

Geographically, the schools range in location from Massachusetts to California, and from Minnesota and Montana to southern Texas. In New York state, which leads the list, there are six schools now using the Little Giant; four are in North Carolina, three in Michigan and Indiana, and, so far, two each in Ohio, California, Pennsylvania, Massachusetts, Tennessee, New Jersey, Iowa, Texas, Kansas, and Arkansas.

Little Giant automatic cylinder press

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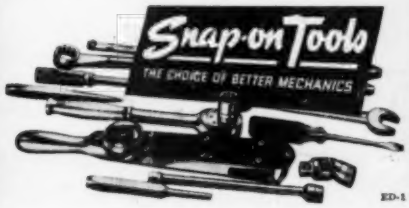


ED-1

All vocational or trade training schools of printing, where students are preparing to enter the graphic arts field, need equipment of the same type and quality as that used in industry. It is in these schools especially where the Little Giant will provide ideal training opportunities on quality jobs, with added economy and safety in operation.

For detailed information, address American Type Founders Sales Corp., 200 Elmora Ave., Elizabeth B, N. J.

For brief reference use IAVE—0102.

NEW ATLAS BELT AND DISK SANDER

The new Atlas belt and disk sander handles long, short, and wide stock; irregular shapes, edges, ends, curves, angles and double angles; and sands metals, woods, and plastics. It is built to produce accurate finishes on a production basis on light or heavy work.

Atlas belt and disk sander

The table, and disk and drum spindles are ground, and disk and pulleys are balanced. The spindles turn on SKF ball bearings. Herringbone slots in belt sander table top keep underside of belt smooth.

The table may be used with either disk or belt. Disk and guard are easily removed for sanding wide stock on belt. Belt operates in both horizontal and vertical positions — guards and stop are removable for sanding curved pieces on either drum.

The disk is 10 in. in diameter. The sanding belt is 4 by 27 13/16 in. The table is 7⅞ by 15 in., and the belt support table is 4¼ by 11⅞ in. The rubber-faced drums are 3¼ in. in diameter, the belt speed is 1150 f.p.m., and the spindle speed is 1360 f.p.m. A ¼- or 1/3-h.p., 1725 r.p.m. motor is recommended.

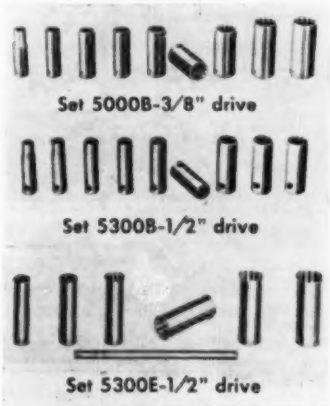
For further information address Atlas Press Co., 26032 N. Pitcher St., Kalamazoo, Mich.

For brief reference use IAVE—0103.

PROTO DEEP SOCKET LINE EXPANDED

Addition of three more extra deep socket wrenches and three deep socket sets has been announced by the Plomb Tool Company, Los Angeles 54, Calif. The three new 12-point Proto sockets — Nos. 5012, 5026, and 5028 — are for ⅜-in. drive and have opening sizes of ⅜, 13/16, and ⅞ in., the last two being needed for spark plugs. One of the new sets — No. 5000B — includes these three sockets and the other six deep sockets available in ¼-in. drive. The other two Proto sets developed are in ½-in. drive. No. 5300B, for general utility work, includes nine 12-point deep sockets, with openings of ½, 9/16, ⅝, 11/16, ¾, 13/16, ⅞, 15/16, and 1 in. No. 5300E, a spark plug set, includes a pin handle and six deep sockets, with openings of ⅝, 11/16, 13/16, ⅞, 15/16, and 1 in.

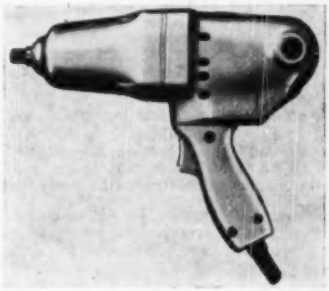
For brief reference use IAVE—0104.



Proto deep socket line

⅜-IN. IMPACT WRENCH

A new line of portable electric impact wrenches has just been announced by The Black & Decker Mfg. Co., Towson 4, Md. This new impact wrench will quickly tighten or remove either left- or right-handed nuts, bolts, and cap screws.



⅜-in. Impact wrench

(Continued on next page)

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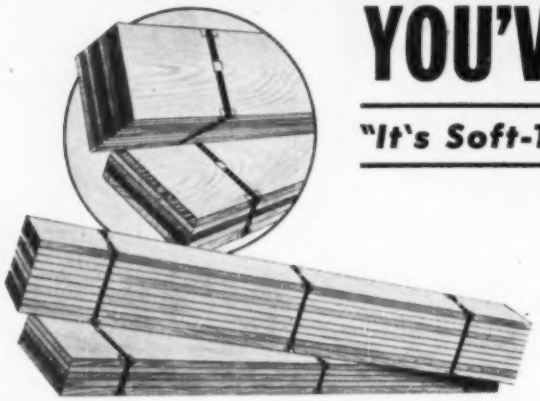

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(Continued from previous page)

This tool is conservatively rated at ⅜-in. thread diameter and will be known as the ⅜-in. impact wrench. It rapidly spins a free running nut or bolt to a seating position with high speed, direct-drive action — then within a matter of seconds a rapid, rotary hammering action drives the nut or bolt to maximum tightness. In removing a fastener the hammering action loosens the nut or bolt, and the direct-drive rapidly spins it free.

There is little or no tendency for the tool to twist in the operator's hand. Lightweight and minor torque reaction reduces operator fatigue.

A reversing switch allows the unit to be used for either driving or removing fasteners, and the efficiency of the tool is the same in either direction. The switch is mounted on the lower side of the housing where it is protected from accidental contact.

The wrench is made of sturdy aluminum castings and has a powerful B & D universal motor. Besides having a side handle with automatic-release switch, reversing switch, and a 3-conductor cable and plug, the Black & Decker impact wrench may be obtained with six hexagon sockets ranging from 9/16 to 15/16 in.

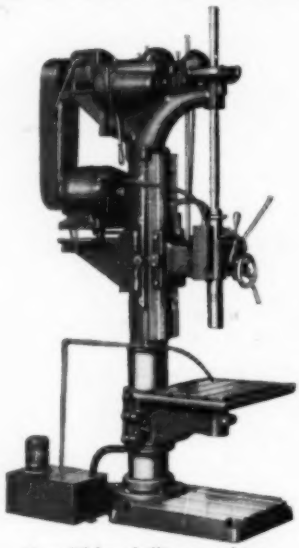
For brief reference use IAVE—0105.

SIBLEY MODELS D-24 AND D-28 DRILLING MACHINES

A new drilling machine known as the Model D is offered in 24-in. and 28-in. swing by The Sibley Machine & Foundry Corporation, South Bend, Ind.

The new Model D offers increased operator efficiency with its V-belt drive direct from the motor to a 4-speed geared transmission. Ease in changing speeds is gained by an "inching" button on a 4-station switch at the front of the machine, and the handy position of the 4-speed transmission lever.

Three optional ranges of spindle speeds are available for Models D-24 and D-28 drilling machines: 21 to 365 r.p.m.; 25 to 419 r.p.m.; and 37 to 650 r.p.m.



New Sibley drilling machines

The spindle quill bearing in the head is easily adjusted to compensate for wear. Motor is 5 h.p. — N.E.M.A. standard type for normal operations. This drive provides ample spindle power for the recommended capacity of 1¼ in. in mild steel. Machines are equipped with electrical reversing for tapping operations.

A 24-in. head travel on column and an 11-in. spindle feed permit a wide range of drilling.

For brief reference use IAVE—0106.

ILLUMINATED DRAWING BOARDS

Two new illuminated drawing boards designed to simplify tracing of illustrations, lettering, and designing of ruled forms on stencil sheets, have been announced by A. B. Dick Company, manufacturers of mimeographs and mimeograph supplies. The Model 4 is the inexpensive, lightweight, portable model, while Model 5 is recommended for precision drawing, lettering and forms. New, movable, calibrated vertical and horizontal rul-

Drawing board No. 4

Drawing board No. 5

ing edges which give drafting table precision facilitate simultaneous design and stencilization of forms, graphs, and charts. Other new features incorporated in this model are fluorescent lighting, new type stencil clamps, and new slot type positioning for the stencil.

The Tiltoscope base, a metal, pedestal-type base with swivel top action is available for use with the Model 5. This base permits the drawing board to be tilted to any convenient working

(Continued on page 26A)

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- SANDERS, all types
- PLANERS, SHAPERS, VISES, woodworking
- MITRE BOXES, ELECTRIC MOTORS
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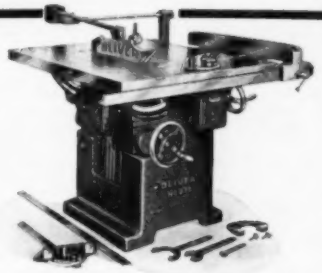

NEW Automatic Saw Guard with Anti-Kick Back Catch assures maximum safety for students

Start your students right. Teach them with this "Oliver" — built for accurate ripping, cross cutting and dadoing. Table remains level while saw tilts up to 45°. Gauges and table graduated to cut a perfect miter, cut-off to length, or rip to width accurately — no delays for checking measurements. Rips to 16" wide to left of saw, 28" to right. Cross cuts up to 16" wide, 3" thick.

Write for Bulletin No. 270

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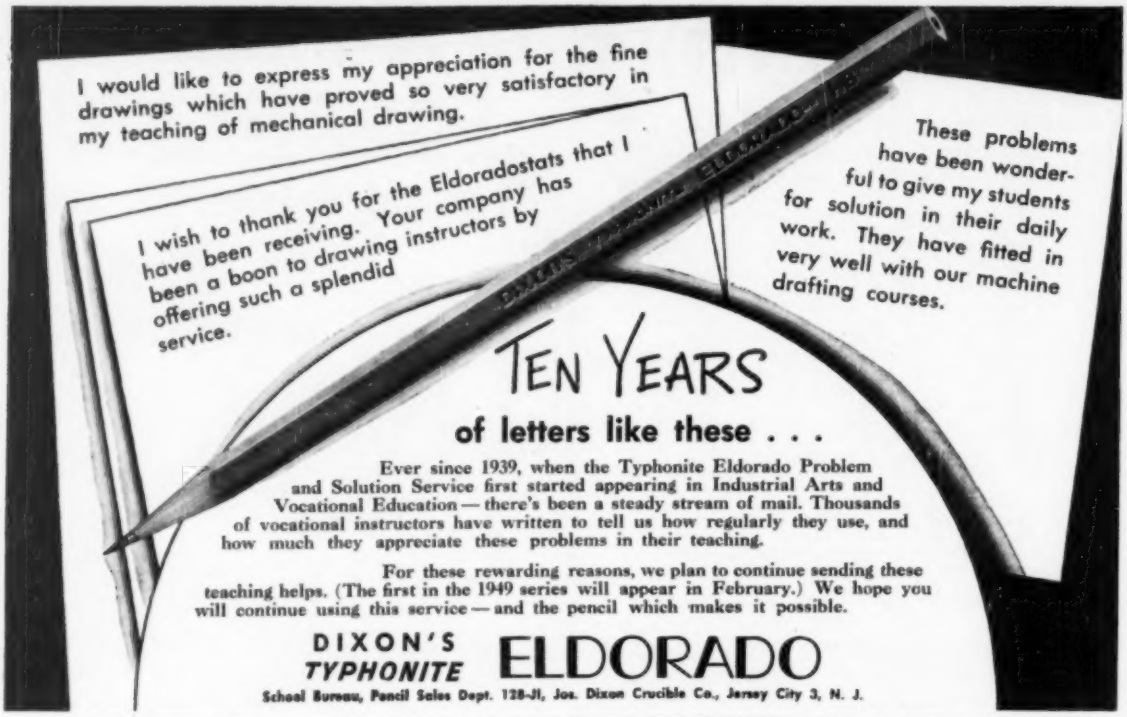
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(Continued from page 24A)

position. Drawing instruments available are lettering guides, styli, and screen plates in various sizes, styles, and patterns. For additional information write A. B. Dick Compay, 720 West Jackson Boulevard, Chicago 6, Ill.

For brief reference use IAVE—0107.

CASCOREZ, A NEW FAST-SETTING GLUE

The chemical division of the Borden Company, 350 Madison Ave., New York 17, N. Y., have developed a new, clean white glue. Laboratory sheer tests show that wood joints glued with the new adhesive, called Cascorez, are stronger than the wood itself.

The glue is entirely stain free. Surplus adhesive may be wiped off with a damp cloth. This leaves the surface of the work in perfect condition for finishing.

Cascorez is available through hardware, paint, and building-supply dealers in 2-oz., 4-oz., 1-pt., and larger sizes.

For brief reference use IAVE—0108.

Cascorez, a fast-setting glue

CATALOGUE OF LITTLE ENGINES

Industrial-arts students and others interested in building model railroads will find this 1948 catalogue of live-steam locomotives highly entertaining and instructive.

The catalogue illustrates and describes the tools and the general supplies needed by the model engine builder, as well as the castings and parts required to produce excellent scale-model locomotives and railroad cars.

Instruction sheets for making the locomotives, trucks, valve-motion details, boilers, etc., also are available. For further information address E. I. Lewis, % Little Engines, P. O. Box 15, Wilmington, Calif.

For brief reference use IAVE—0109.

NEW HOBART BROTHERS COMPANY ELECTRODES

The electrode, "Hobart Nickelcast," is a 100 per cent Nickel electrode for producing machinable welds on cast iron without preheating the metal. The welds are machinable both in the deposit and line of fusion and may be drilled, tapped, or machined at any point in the weld zone. Nickelcast is free from fluorides and will not produce injurious gases. The coating is insulated to prevent arcing through when working in confined quarters. Nickelcast electrodes can be used with either a.c. or d.c. welding current and are available in 3/32, ⅛, 5/32, and 3/16-in. diameters.

The electrode, "Hobart No. 90-PL," is a low hydrogen coated electrode designed for welding high carbon, high sulphur, and other hard-to-weld steels without underbead cracking. The absence of underbead cracking is achieved by a special low hydrogen coating. This electrode has a smooth and steady arc insuring good root penetration. Deposited weld metal is sound with high ductility. Physical properties of this electrode are: tensile strength, 94,000 p.s.i., yield point, 85,000 p.s.i., and 26 per cent elongation in 2 in. Hobart No. 90-PL is available in 3/32, ⅛, 5/32, 7/32, and ¼-in. diameters for use with d.c. welding current only.

For brief reference use IAVE—0110.

DIAMOND WHEELS FOR CARBIDE GRINDING

A 16-page booklet, under the title of "Grits and Grinds," has been issued by Norton Co., Worcester 6, Mass.

It discusses the diamond grinding wheel, and gives definite recommendations as to their use in carbide grinding.

Selection of bond, grit size, grade or hardness, diamond concentration, and operation, are all clearly explained. There also is a chapter on how much the flange screws on these diamond wheels should be tightened.

For brief reference use IAVE—0111.

NEW SHELDON CATALOG

The new Sheldon G-48 catalog describes, illustrates, and gives detailed specifications of the new postwar Sheldon and Sheldon-Vernon machine tools, accessories, and attachments, which are all large capacity size, moderately priced, and yet extremely accurate.

The unique feature of the catalog is that it is so arranged that illustrations, descriptions, and detailed specifications are in every instance on the same or facing pages, obviating all need for confusing cross references. A total of 52 types and models of 10-, 11-, and 12-in. Sheldon precision lathes and Sheldon-Vernon shapers and milling machines are covered, with over 70 accessories and attachments, in this 16-page catalog.

For brief reference use IAVE—0112.

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For Industrial Arts and Vocational Classes. By Gerald B. Baysinger and G. Harold Silvius. A helpful guide to setting up and supervising industrial arts and vocational programs in which students assume a share of the responsibility for planning the work: (personnel organization, job projects, work sheets with space for student organization facts and instructor's evaluation). 64 pages, illustrated, second edition, sixth printing. 8½ x 11 inches. 50c list

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By Earl L. Bedell and Ernest G. Gardner. A popular text book which has been adopted by more than 300 school systems all over the country. It describes every household repair job, from a leaky faucet to a frozen pipe, with step-by-step procedures clearly outlined. All the material has been proven by experienced teachers to have a tremendous appeal for the pupil. The information, profusely illustrated, is set up in the form of jobs, and there is a splendid section on the home workshop, hand and power tools and their care. 256 pages, 642 illustrations; 148 jobs; second edition, cloth bound with jacket. 8 x 11 inches. $2.50 list

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(Continued from page 20A)

PEN SOCKETS

1135. Q.: Will you please send me information as to where I might purchase the penholders or pen sockets for the Keene Cement projects explained in the book *Keene Cement Craft* by O. Arnold Radtke? — *D. C. B.*

A.: Penholders and pens may be obtained from the H. H. Niedecken Company, Milwaukee, Wis. — *O. A. R.*

New Publications

Radar Primer

By J. L. Hornung. Cloth, 218 pp., 5¾ by 8¼ in., illus., $2.80. McGraw-Hill Book Co. Inc., New York City.

A book which gives the reader a simplified presentation of radar, and of its peacetime uses. It is a text for the beginner written in simple language so that technical terms may be understood readily.

The book also contains in a similar easily understood explanatory way, the essential features of television, loran, and sonar. There are many simple diagrams and illustrations, helpful study questions, and a bibliography for those who want to delve deeper into this very up-to-date subject.

Popular Mechanics Farm Manual

Prepared by the Editors of Popular Mechanics. Cloth, 284 pp., 6⅝ by 9½ in., illus., $3. Popular Mechanics Press, 200 East Ontario St., Chicago 11, Ill.

A compendium of hundreds of helpful hints to help the farmer increase the efficiency and beautify his home and lands.

There are six chapters which show how to make machinery and implements from castoffs; how to arrange a workshop; make poultry and livestock houses, pens, and equipment; store and process vegetables; and improve the farm home.

Besides all this the book contains many farm hints and kinks.

An Analysis of Drafting for Teachers

By F. R. Kepler, Fred S. Nicholson, William G. Sloat, and N. Ralph Tucker. Paper cover, 154 pp., 6 by 9¼ in., illus., $1.50. D. C. Heath and Co., 285 Columbus Ave., Boston 16, Mass.

This booklet presents a complete analysis of the content of mechanical and engineering drawing in outline form. The book will be found helpful to teachers in planning courses of study and in standardizing drafting practices.

This analysis is the result of research by a committee of the Michigan Industrial Education Society. Its authors are outstanding as leaders in the teaching of drafting.

An appendix includes the complete *American Standard, Drawings and Drafting Room Practice* together with a helpful *index* of the standards.

Electrical Projects for the School and Home Workshop

By Walter B. Ford. Cloth, 168 pp., 6¼ by 9½ in., illus., $3. The Bruce Publishing Co., 540 North Milwaukee St., Milwaukee 1, Wis.

The author uses the projects described in this book to make the subject of electricity more understandable to his students. Other teachers, no doubt, will find them as useful in their classes, as he has with his students.

Useful as these projects have proved themselves in the school, they also hold interest and value for those who love to tinker with things electrical in the home workshop.

The book contains 34 of these very well made projects. They are all clearly described, well illustrated, and all of them are accompanied by bills of materials.

The Industrial Arts Program

By Louis V. Newkirk and William H. Johnson. Cloth, 357 pp., 6¼ by 9½ in., illus. The Macmillan Co., New York, N. Y.

(Continued on page 30A)

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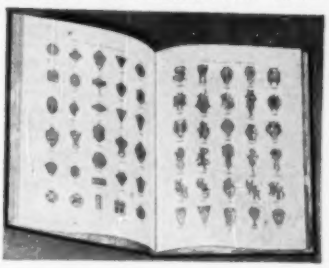

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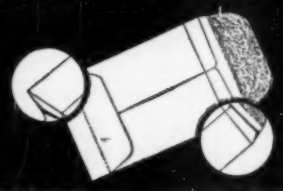

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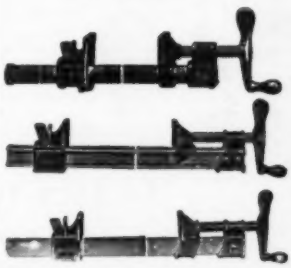

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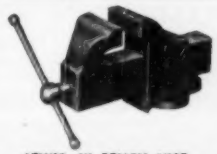

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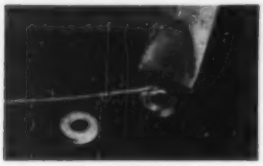

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Mechanical Drawing

By Thomas E. French and Carl L. Svensen. Cloth, 437 pp., 6¼ by 9⅛ in., illus., $2.80. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City.

This is a new edition of this well-known text. In it are recorded the progress and improvement that time has made necessary and proper. New chapters, for instance, have been added on production drawing, aircraft drawing, and welding drawing. Visual materials have also been prepared by the publishers to go with this book.

Industrial Arts in General Education

By Gordon O. Wilber. Cloth, 362 pp., 5½ by 8¼ in., illus., $3.50. International Textbook Co., Scranton, Pa.

A book that ought to be read by all industrial-arts teachers. It will help them get a better view of the relationship of industrial arts to the general education of which it is a part.

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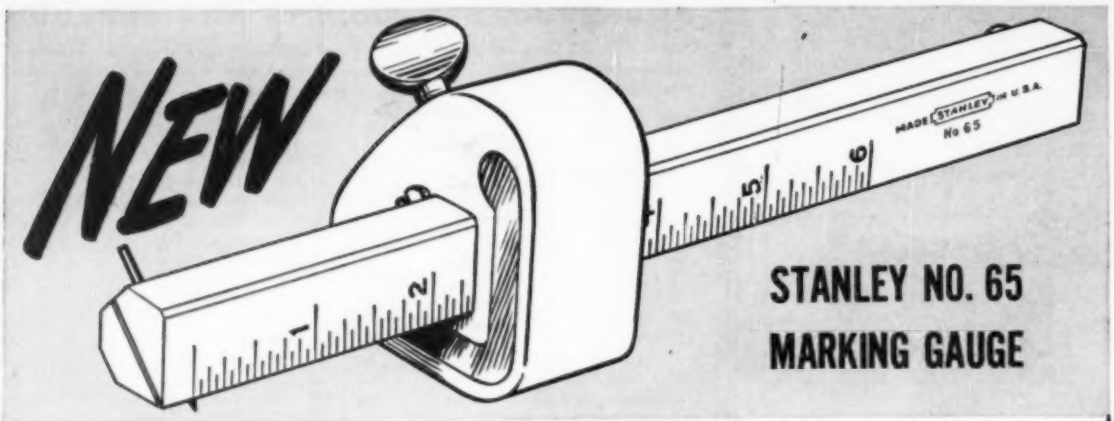

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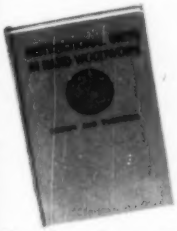

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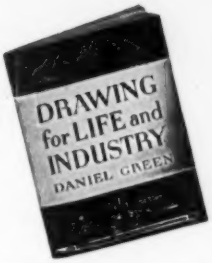

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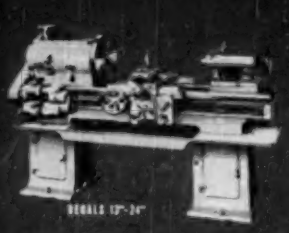

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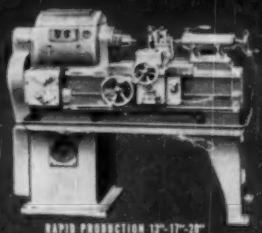

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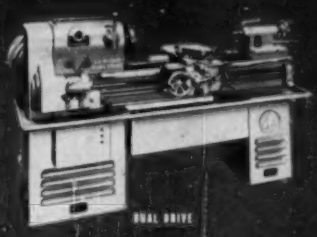

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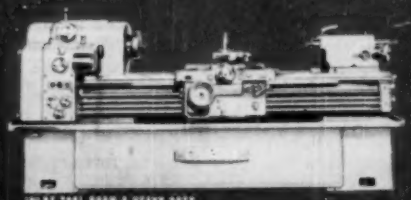

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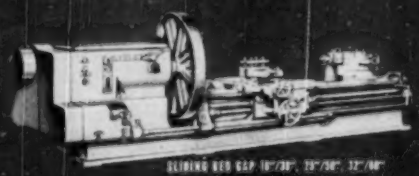

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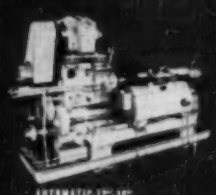

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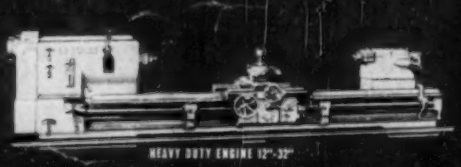

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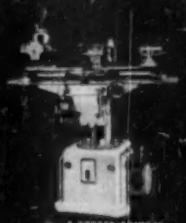

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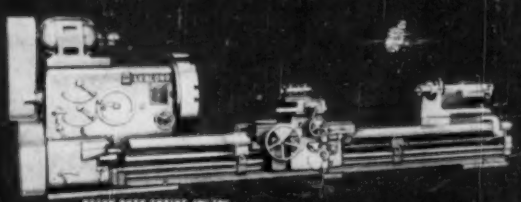

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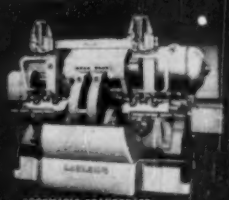

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